Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Initial Study Report Meetings
October 21, 2014
Part B – Agenda and Presentations

Alaska Energy Authority - Board Room
813 West Northern Lights Blvd.
Anchorage, Alaska 99503

Filed November 15, 2014

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

SUSITNA-WATANA HYDRO

Agenda and Schedule
Initial Study Report (ISR) Meeting
Wildlife and Botanical Programs (Studies 10.5–10.20; 11.5, 11.7–11.9)
October 21, 2014

Location	Alaska Energy Authority – Board Room 813 West Northern Lights Blvd. Anchorage, AK 99503
Time	8:30 A.M. – 4:30 P.M. AKDT
Subject	ISR Meetings
GoTo Meeting	https://www4.gotomeeting.com/register/223805607 1-888-585-9008 Code: 810-056-852
Goal	Review study objectives, methods, variances, results, decision points, proposed modifications, steps to complete studies, and discuss licensing participants' comments.
Agenda Items	[*Note: Individual study presentations may require less or more time than estimated, depending on extent of discussion*.]
8:30 – 8:50	Introductions and Review Agenda
8:50 – 10:00	▪ Waterbird Migration, Breeding, and Habitat Use (Study 10.15)—Tim Obritschkewitsch, ABR ▪ Surveys of Eagles and Other Raptors (Study 10.14)—John Shook, ABR ▪ Landbird and Shorebird Migration, Breeding, and Habitat Use (Study 10.16)—Terry Schick, ABR
10:00 – 10:15	Break
10:15 – 12:00	▪ Moose Distribution, Abundance, Movements, Productivity, and Survival (Study 10.5)—Kim Jones, ADF&G ▪ Caribou Distribution, Abundance, Movements, Productivity, and Survival (Study 10.6)—Kim Jones, ADF&G ▪ Dall's Sheep Distribution and Abundance (Study 10.7)— Kim Jones, ADF&G / Brian Lawhead, ABR ▪ Wolverine Distribution, Abundance, and Habitat Occupancy (Study 10.9)—Mark Burch, ADF&G ▪ Population Ecology of Willow Ptarmigan in Game Management Unit 13 (Study 10.17)—Rick Merizon, ADF&G ▪ Terrestrial Furbearer Abundance and Habitat Use (Study 10.10)—Casey Pozzanghera / Laura Prugh, IAB–UAF

12:00 – 1:00 Lunch

1:00 – 2:45

- Bat Distribution and Habitat Use (Study 10.13)—Nate Schwab, ABR
- Aquatic Furbearer Abundance and Habitat Use (Study 10.11)—Alex Prichard, ABR
- Wood Frog Occupancy and Habitat Use (Study 10.18)—Todd Mabee, ABR
- Distribution, Abundance, and Habitat Use by Large Carnivores (Study 10.8)—Brian Lawhead / Alex Prichard, ABR
- Small Mammal Species Composition and Habitat Use (Study 10.12)—Brian Lawhead, ABR
- Wildlife Harvest Analysis (Study 10.20)—Alex Prichard, ABR
- Evaluation of Wildlife Habitat Use (Study 10.19)—Terry Schick, ABR

2:45 – 3:00 Break

3:00 – 4:30

- Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin (Study 11.5)—Terry Schick, ABR
- Wetland Mapping Study in the Upper and Middle Susitna Basin (Study 11.7)—Wendy Davis, ABR
- Rare Plant Study (Study 11.8)—Terry Schick / Wendy Davis, ABR
- Invasive Plant Study (Study 11.9)— Terry Schick / Wendy Davis, ABR

Initial Study Report Meeting

Study 10.15 Waterbird Migration, Breeding, and Habitat Use

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 10.15 Objectives
(ISR Part A – Section 2)

- Document the occurrence, distribution, abundance, habitat use, and seasonal timing of waterbirds **migrating** through the Project area in spring and fall.

- Document the occurrence, distribution, abundance, productivity, and habitat use of waterbirds **breeding** in the Project area.

- Review available information to characterize **food habits and diets of piscivorous waterbirds** documented in the study area as background for Study 5.7 (Mercury Assessment and Potential for Bioaccumulation).

Study 10.15 Components
(ISR Part A – Section 4)

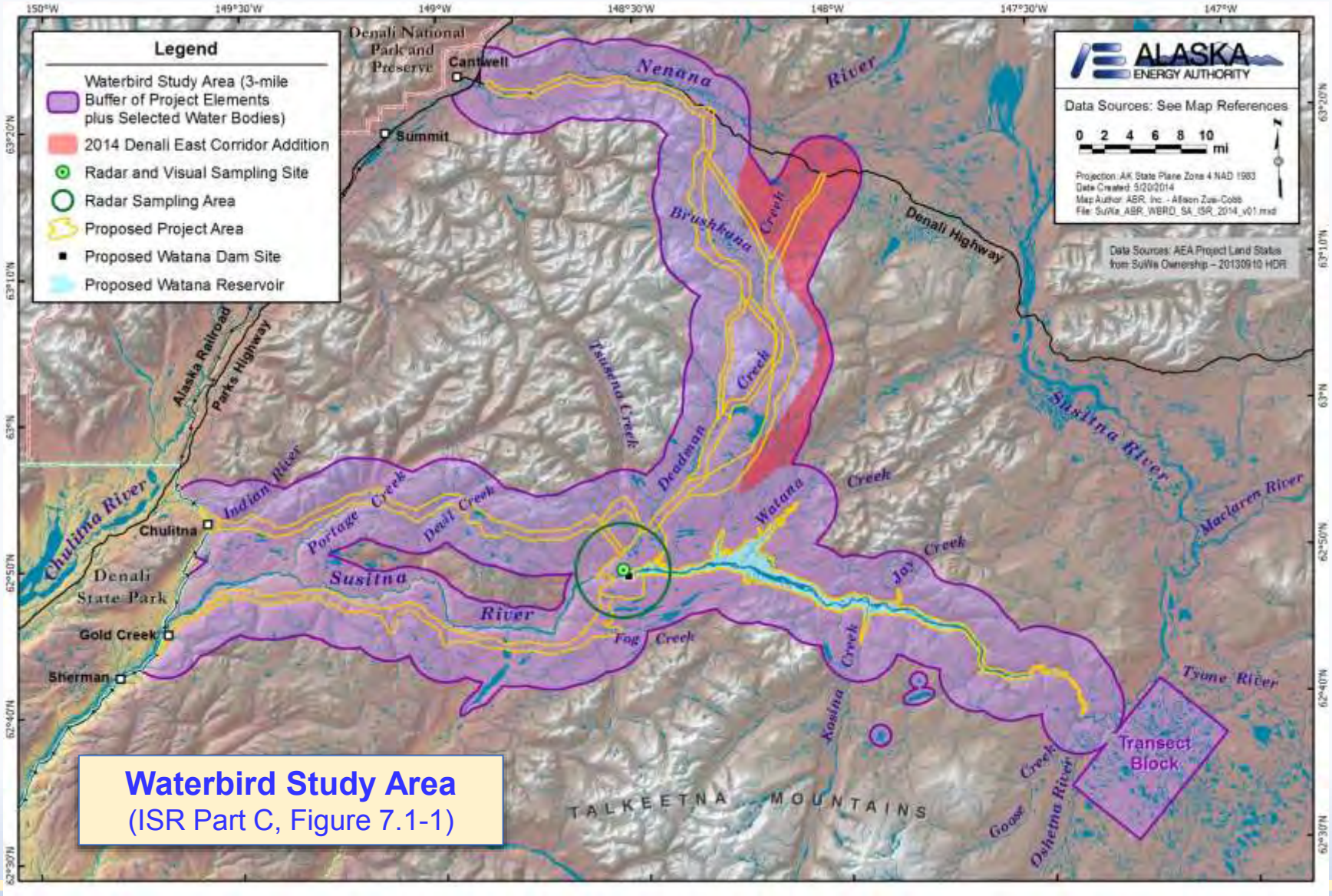
- **Spring and Fall Migration Surveys** (ISR Part A, Section 4.1):
  - Aerial surveys.
  - Ground-based radar and visual surveys (for all bird species, not just waterbirds).
- **Breeding Season** (ISR Part A, Section 4.2):
  - Breeding population surveys.
  - Harlequin Duck surveys (pre-nesting and brood-rearing).
  - Brood surveys.
- **Information for Mercury Study** (ISR Part A, Section 4.3):
  - Literature review on food habits and diets.
  - Locate nests for potential acquisition of samples (feathers, eggs) for lab analysis.

Study 10.15 Variances

- The **number of aerial surveys flown during migration** (RSP Section 10.15.4.1.1) **was reduced** by 3 surveys in spring and 2 surveys in fall to maintain a 5-day interval between surveys, each of which typically required more than one day to complete.
- The "breeding-pair survey" proposed in RSP Section 10.15.4.2.1 was replaced with "breeding population survey," a more inclusive survey method.
- **Harlequin Duck surveys** (RSP Section 10.15.4.2.2) **were restricted to 10 river miles beyond the study area buffer** due to logistical constraints.
- After further clarification of the ground-based visual and radar methodologies proposed in the Study Plan, the USFWS dropped its recommendation (which was accepted by FERC in the February 1 Study Plan Determination) to use 4 observers for visual surveys during migration studies, so **visual surveys were conducted using a single observer, as originally proposed** in RSP Section 10.15.4.1.2.
- The Study Plan objective to **acquire tissue samples of piscivorous waterbirds for laboratory analysis of mercury levels**, based on opportunistically finding nests during breeding aerial surveys and visiting those nests to collect feather samples (RSP Section 10.15.4.3), **was not met during the 2013 study season** because fewer nests of piscivorous waterbirds were found than anticipated in 2013.

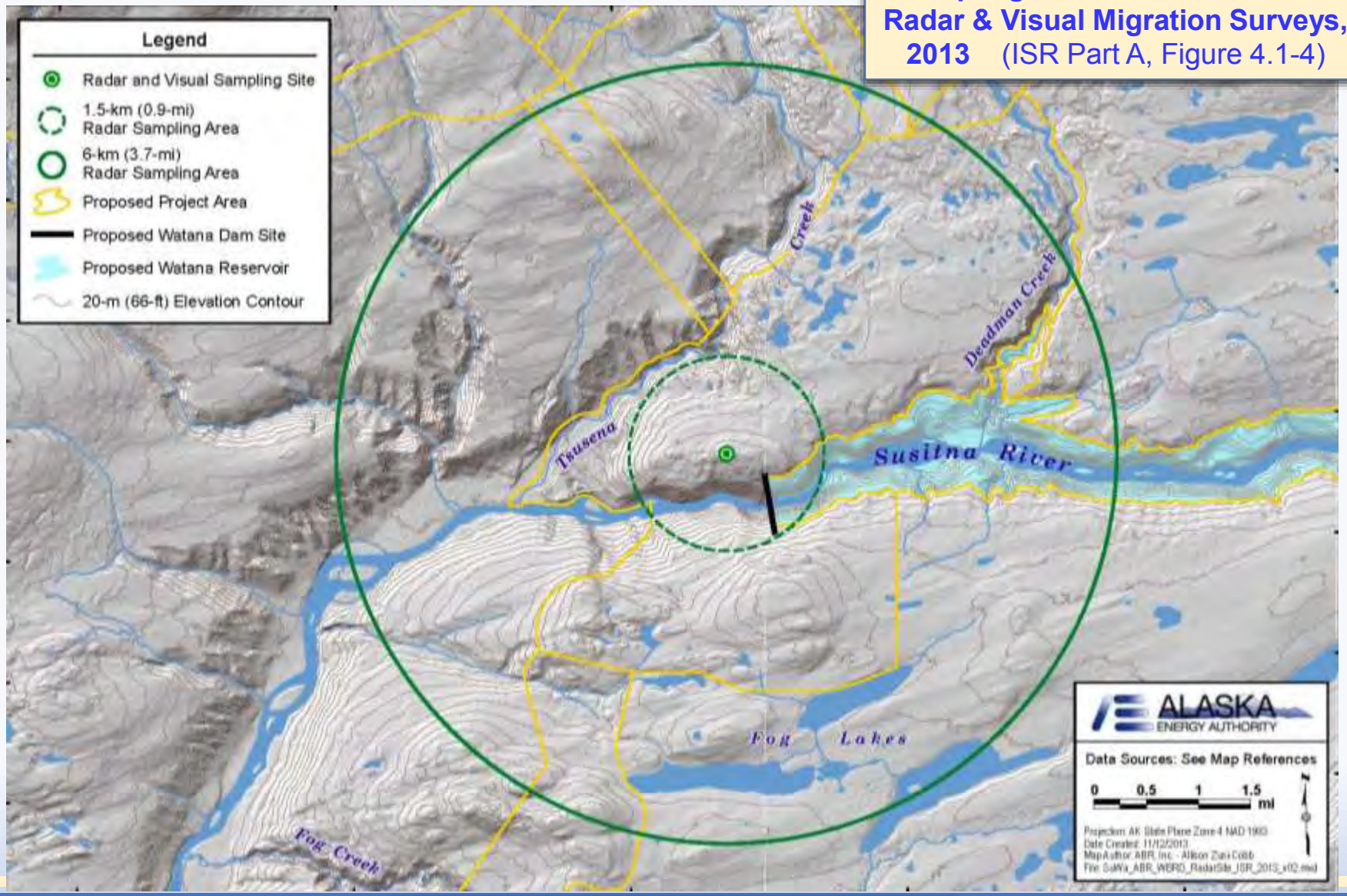
Study 10.15 Summary of Results in ISR

(ISR Part A – Section 5)



Study 10.15 Summary of Results in ISR

Sampling Site for Ground-based Radar & Visual Migration Surveys, 2013 (ISR Part A, Figure 4.1-4)



Study 10.15 Summary of Results in ISR

Spring and Fall Migration 2013 (from ISR Part B – Appendix T, Table 1)

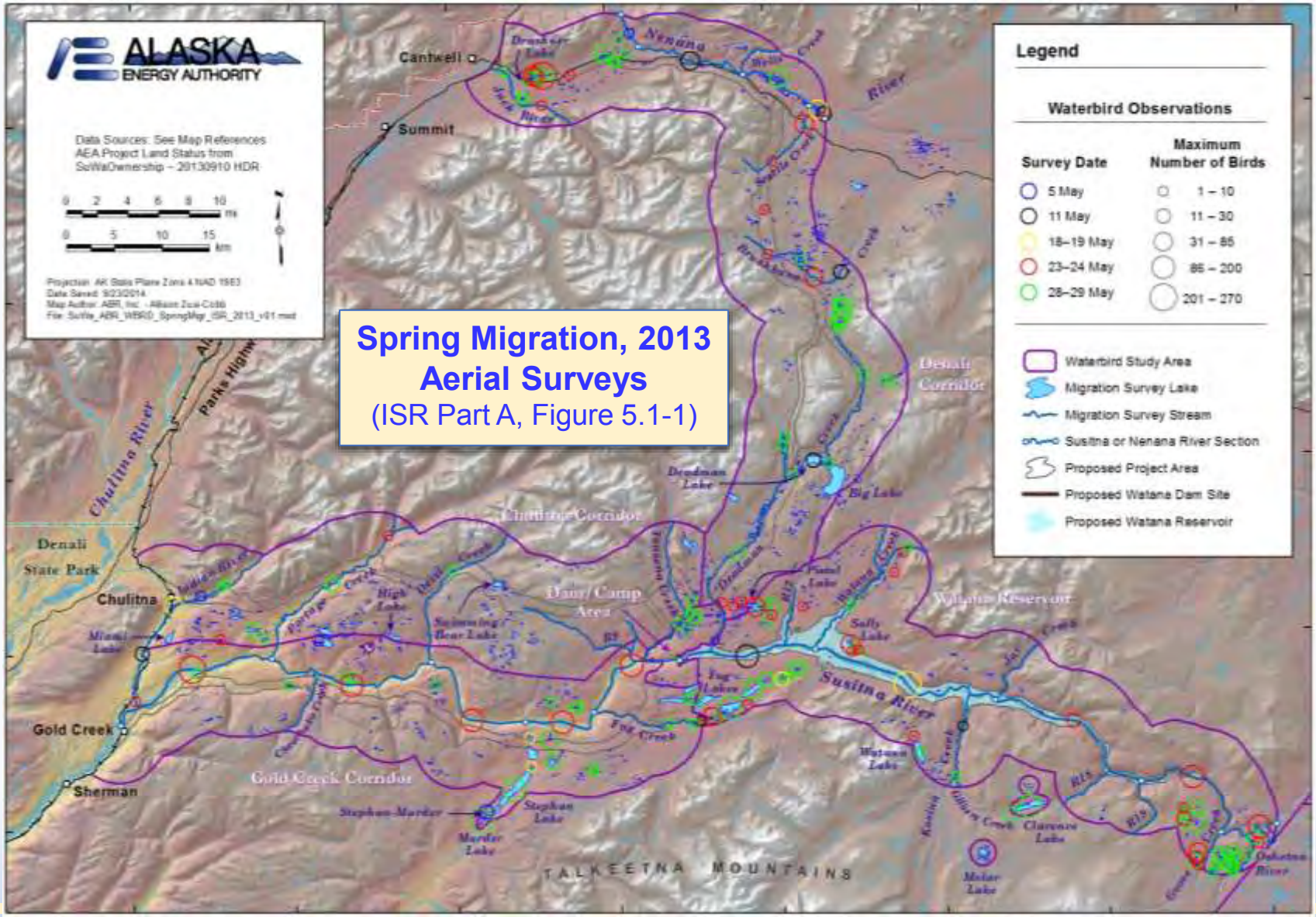
	Survey Type			
	Waterbird Aerial Surveys	**Ground-based Visual Surveys**	**Diurnal Radar Surveys**	**Nocturnal Radar Surveys**
Spring Survey Period (days / hours)	Apr 23–May 29 (**7** / na)	Apr 20–Jun 3 (**45 / 651**)	Apr 20–Jun 3 (**42 / 88**)	Apr 20–Jun 3 (**42 / 184**)
Fall Survey Period (days / hours)	Aug 14–Oct 18 (**11** / na)	Aug 16–Oct 15 (**61 / 652**)	Aug 16–Oct 15 (**53 / 94**)	Aug 16–Oct 15 (**59 / 367**)
Survey Area	Water bodies within 3-mi (5-km) buffer of Project area	Within 10 km of proposed dam site	Within 6 km of proposed dam site	Within 6 km of proposed dam site
Number of Survey Points	na	1	1	1
Species Recorded	Waterbirds	All	All (undifferentiated)	All (undifferentiated)
Key Results	Abundance, species composition, distribution, seasonal variation, relative importance of waterbodies	Abundance, species composition, movement rates, flight altitude, flight behavior, flight direction, seasonal and daily variation	Passage rates, flight altitude, flight direction, seasonal and daily variation, landscape patterns	Passage rates, flight altitude, flight direction, seasonal and daily variation, landscape patterns

Study 10.15 Summary of Results in ISR

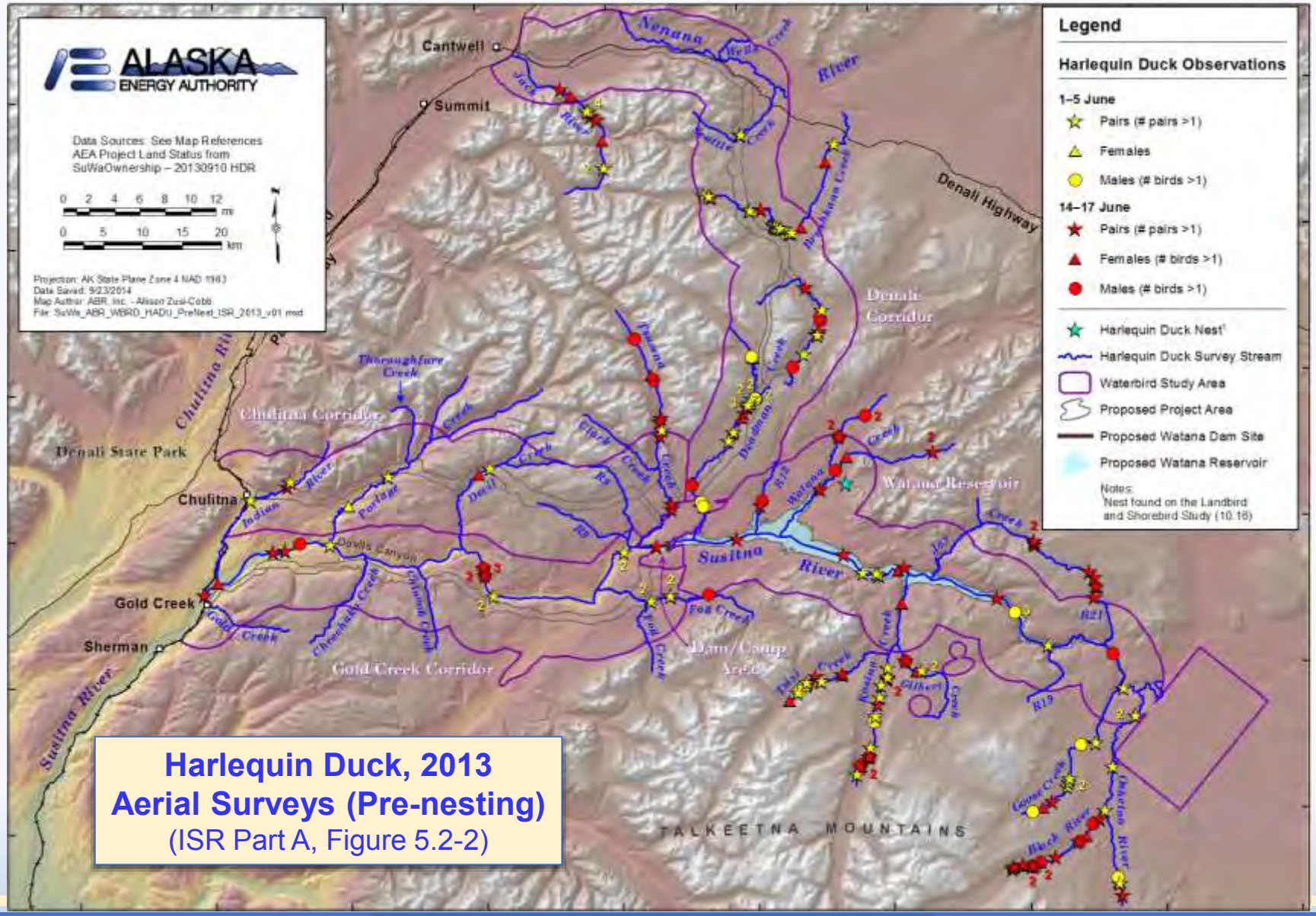
Ground-based Visual Migration Surveys
(from ISR Part B – Appendix T, Tables 2 and 3)

Species Group	Spring 2013		Fall 2013	
	Relative Abundance	Peak Occurrence	Relative Abundance	Peak Occurrence
Waterfowl	2,658	May 5	372	Sep 23
Swans	1,086	May 5	301	Sep 30
Geese	308	May 7	19	Oct 2
Ducks	1,136	May 28	3	Sep 28
Raptors	468	May 21	173	Sep 28
Eagles	215	May 21	52	Sep 28
Other raptors	218	May 9	108	Sep 28
Cranes	23	May 9	1,754	Sep 24
Shorebirds	1,181	May 17	0	–
Passerines	3,369	May 17	3,913	Sep 12

Study 10.15 Summary of Results in ISR



Study 10.15 Summary of Results in ISR



Harlequin Duck, 2013
Aerial Surveys (Pre-nesting)
(ISR Part A, Figure 5.2-2)

AEA Proposed Modifications to Study 10.15 in ISR

(ISR Part C – Section 7.1.2)

- **AEA added the Denali East Option** (access road and transmission corridor) to the study area.
- The aerial survey effort in 2014 incorporated the variances from 2013 (described in Sections 4.1.1.1, 4.2.1.1, and 4.2.2.1).
- **AEA will not conduct a second year of the ground-based migration monitoring effort in 2014 or 2015**, based on the results of the radar and visual migration surveys (RSP Section 10.15.4.1.2) conducted in 2013 and reported in Part A and in Part B, Appendix T of this ISR.
- **The objectives and methods in this study related to mercury analysis**, including the literature review of food habits and diets of piscivorous waterbirds and collection of feather samples, **have been consolidated under Study 5.7** (Mercury Assessment and Potential for Bioaccumulation).

New Modifications to Study 10.15 since ISR

The Chulitna Corridor has been dropped from the study area.

Study 10.15 Summary of Results since ISR

	Aerial Surveys 2014					
	Spring Migration	**Breeding Population**	**Harlequin Duck (Pre-nesting)**	**Waterbird Broods**	**Harlequin Duck (Broods)**	**Fall Migration**
Status	**Complete**	**Complete**	**Complete**	**Complete**	**Complete**	**Complete**
Survey Period (# Surveys)	Apr 23–May 18 (5)	May 24–Jun 6 (2)	May 24–Jun 6 (2)	Jul 9–Aug 6 (3)	Aug 1–19 (2)	Aug 24–Oct 19 (10)
Survey Area	Waterbodies within 3-mi (5-km) buffer of Project area	Waterbodies within 3-mi (5-km) buffer of Project area	Rivers up to 10 mi (16 km) outside of Project area	Waterbodies within 1-mi (1.6-km) buffer of Project area	Rivers up to 10 mi (16 km) outside of Project area	Waterbodies within 3-mi (5-km) buffer of Project area
Species Recorded	Waterbirds	Waterbirds	Harlequin Ducks	Waterbird broods	Harlequin Ducks	Waterbirds
Key Results	Abundance, species composition, distribution, seasonal variation, relative importance of waterbodies	Abundance, species composition, distribution, seasonal variation	Abundance, distribution, seasonal variation	Abundance, species composition, distribution, brood size and age, nest initiation, seasonal variation	Abundance, distribution, brood size and age, nest initiation, seasonal variation	Abundance, species composition, distribution, seasonal variation, relative importance of waterbodies

Decision Points from Study Plan

- The Study Plan (RSP Section 10.15.6) stated that the decision to continue the ground-based radar and visual migration surveys would be based on evaluation of the results obtained in 2013, the first year of study. Further discussion with USFWS, ADF&G, and other licensing participants began in technical meetings on March 6, 2014 and will continue during the ISR meeting and comment process to assess the adequacy of the 2013 radar/visual migration surveys in fulfilling the Study Plan objectives and providing sufficient data to address potential protection, mitigation, and enhancement measures regarding migrating birds in the Project area.

- AEA considers the data obtained in 2013 to have met the objective stated in the RSP to "document the occurrence, distribution, abundance, habitat use, and seasonal timing of waterbirds migrating through the Project area in spring and fall." The radar and visual surveys of bird movements in 2013 in the vicinity of the proposed Watana Dam site were the most comprehensive migration surveys conducted for the upper Susitna River Basin to date and the results have been compared with those of other comparable studies in interior and Southcentral Alaska in ISR Part B, Appendix T.

Steps to Complete Study 10.15
(ISR Part C – Section 7.1)

- The Study Plan required two seasons of data collection for the aerial survey component, which was completed in 2014. Aerial surveys of waterbirds in 2014 began in mid-May and were completed in mid-October.
- Data analyses will be completed in winter 2014–2015 and the results will be combined and synthesized with those from 2013 for inclusion in the USR.

Licensing Participants' Proposed Modifications to Study 10.15?

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 10.14
Surveys of Eagles and Other Raptors

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 10.14 Objectives

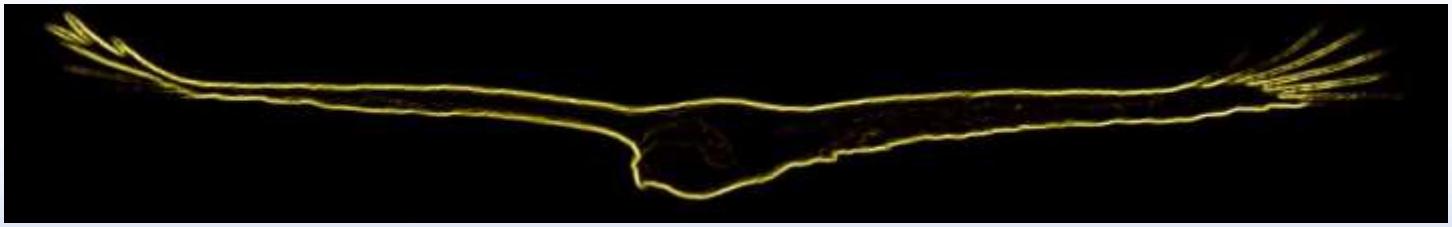
- Locate and determine the status of raptor nests and territories that could be affected by Project construction and operations.
- Estimate Project effects on the productivity of raptors.
- Estimate effects on habitats by delineating habitat features in a geospatial database.
- Conduct field surveys and literature review to study the habitat-use patterns at fall and winter communal roost and foraging sites of raptors.
- Assess whether planned overhead transmission lines pose a collision risk to migrating or nesting raptors and identify migratory corridors.
- Provide information on the distribution, abundance, food habits, and diet of piscivorous (fish-eating) raptors for Study 5.7 (Mercury Assessment and Potential for Bioaccumulation); feather samples for characterization of mercury levels; and information on the effects of methylmercury on piscivorous raptors.

Study 10.14 Components

- **Nest Occupancy & Productivity Surveys** (ISR Part A, Section 4.1, p 5)
- **Foraging and Roost Surveys** (ISR Part A, Section 4.2, p 8)
- **Migration Surveys** (ISR Part A, Section 4.3, p 8)
- Mercury Assessment (ISR Part A, Section 4.4, p 10)
- Delineation of Eagle Nesting Habitats (ISR Part A, Section 4.5, p 10)

Study 10.14 Variances

- The occupancy and productivity surveys included limited extensions outside of the study area (RSP Section 10.14.3) to replicate the study area covered in the 2012 surveys.
- Access to some (at least 4) potential observation sites for the migration survey task (RSP Section 10.14.4.1) could not be achieved in 2013 due to the lack of a land-access agreement with the Cook Inlet Regional Working Group (CIRWG).
- Feather samples were not obtained from piscivorous raptors for mercury analysis in 2013 (RSP Section 10.14.4.1) because the necessary federal permit for salvage of Bald Eagle feathers could not be obtained in time before the season ended.



Study 10.14 Summary of Results in ISR

(ISR Part A – Section 5)

Nest Occupancy and Productivity Surveys

- Golden and Bald eagles are the most common species.

2013 Species	Total Nests	No. of Occupied Nests	No. of Occupied Territories [1]	No. of Incubating Pairs	No. of Successful Pairs [2]	No. of Nestlings
Golden Eagle	235	43 (24)	37 [3] (19 [4])	5	2	2
Bald Eagle	40	23 (3)	23 [5] (1)	13 [5]	5 [5]	5 [5]
Gyrfalcon	6	3	3	3	2–3	3–4
Peregrine Falcon [6]		7	7	7	4–6	9–13
Red-tailed Hawk		(1 [7])	(1)	0	0	0
Common Raven	35	6	6	5	–	–
Unidentified raptor	24	0	0	0	0	0
Northern Goshawk	4	1	1	0	0	0

(Parentheses indicate additional possible territories or nests as a result of unknown occupancy status.)

[1] Some occupied territories contained several occupied nests.

[2] Young ≥75% of fledging age (estimated by comparing with known-age photos).

[3] One occupied nest that did not have incubating adults was located 50 m outside of the study area and the occupied territory was included in calculations.

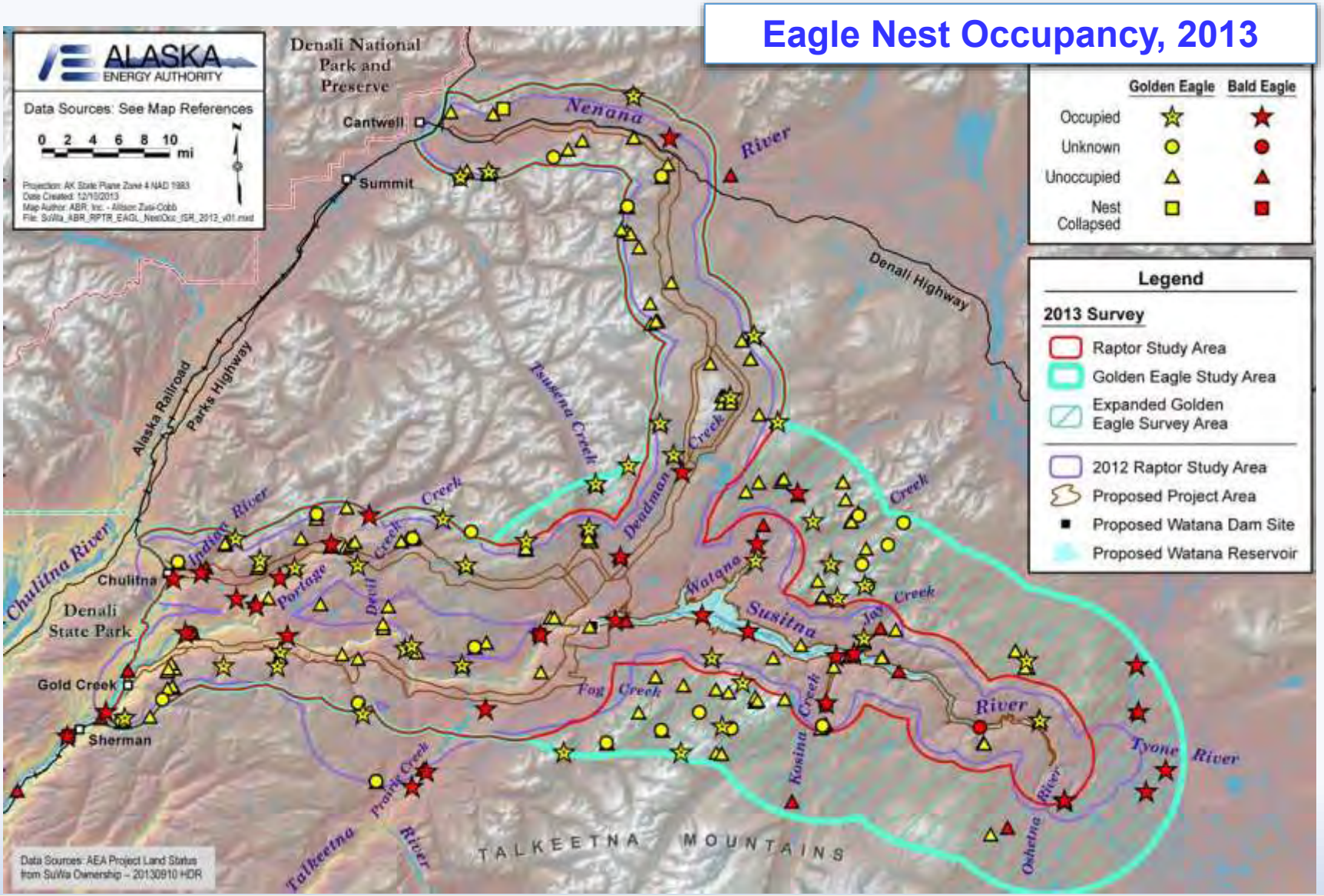
[4] One nest with an unknown occupancy status was found 68 m outside of the study area and the unknown occupancy status was included in calculations.

[5] One nest located 185 m outside of the study area was occupied by a breeding pair of Bald Eagles. Due to this nest's proximity to the study area this territory was included in calculations.

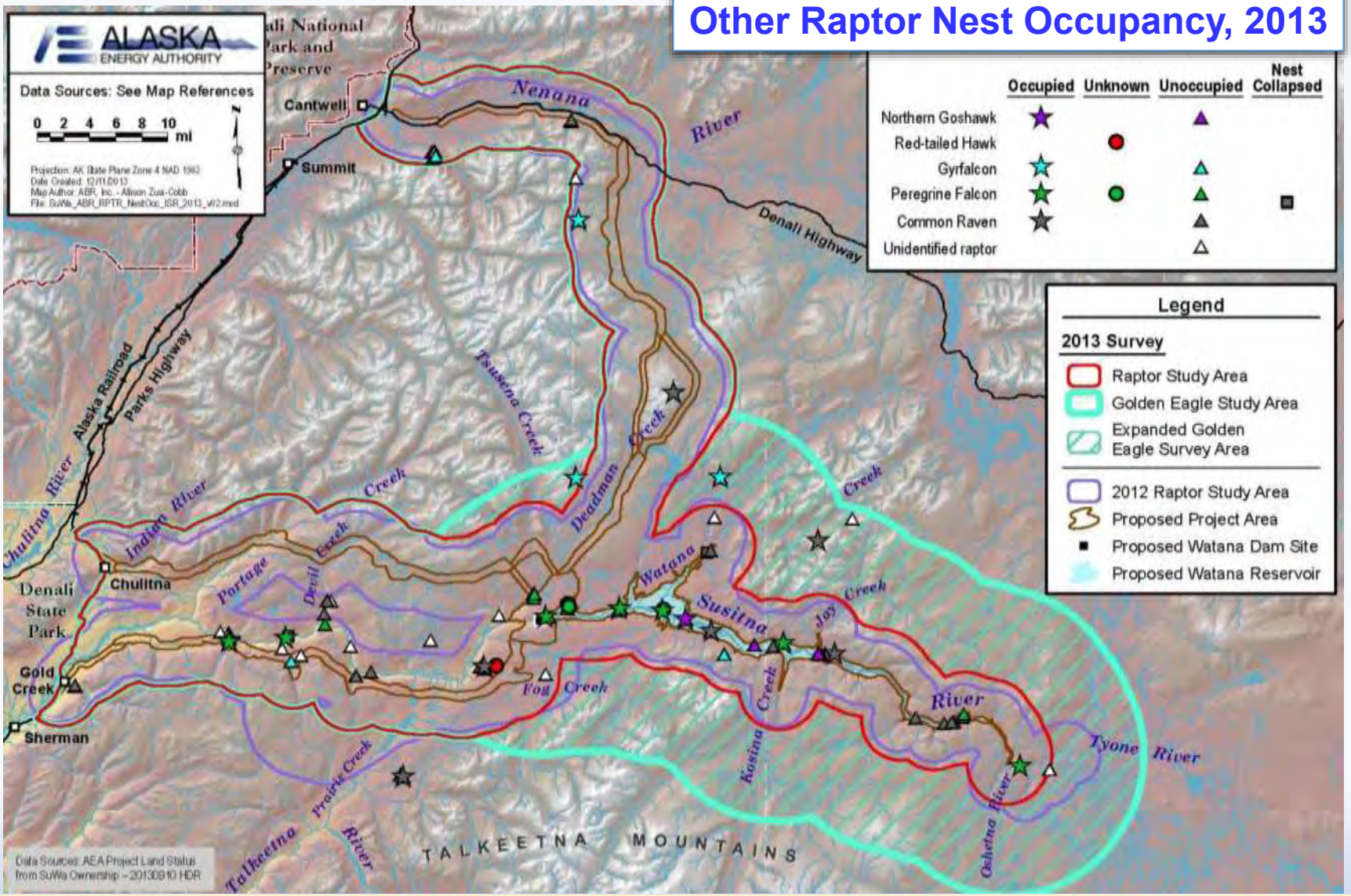
[6] Ledges and nests were only recorded if currently occupied by a Peregrine Falcon.

[7] A Red-tailed Hawk was possibly occupying the same Golden Eagle nest it used in 2012.

Study 10.14 Summary of Results in ISR



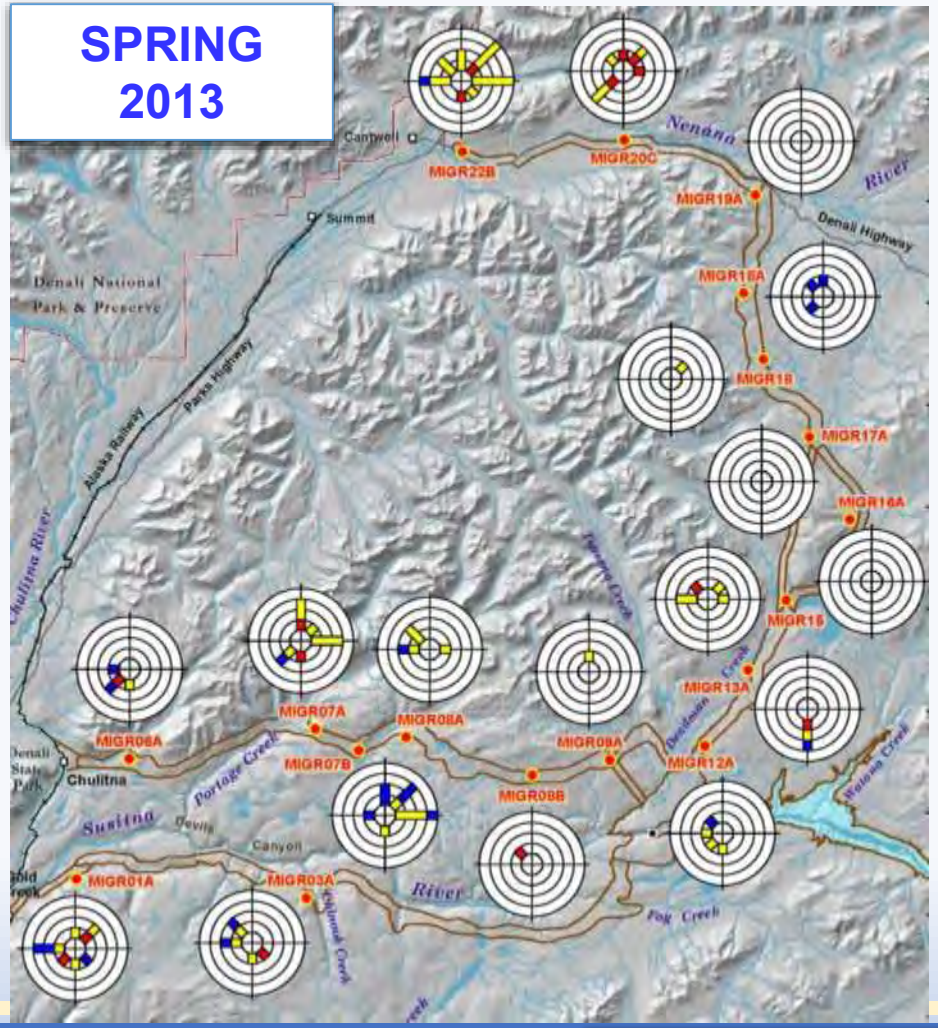
Study 10.14 Summary of Results in ISR

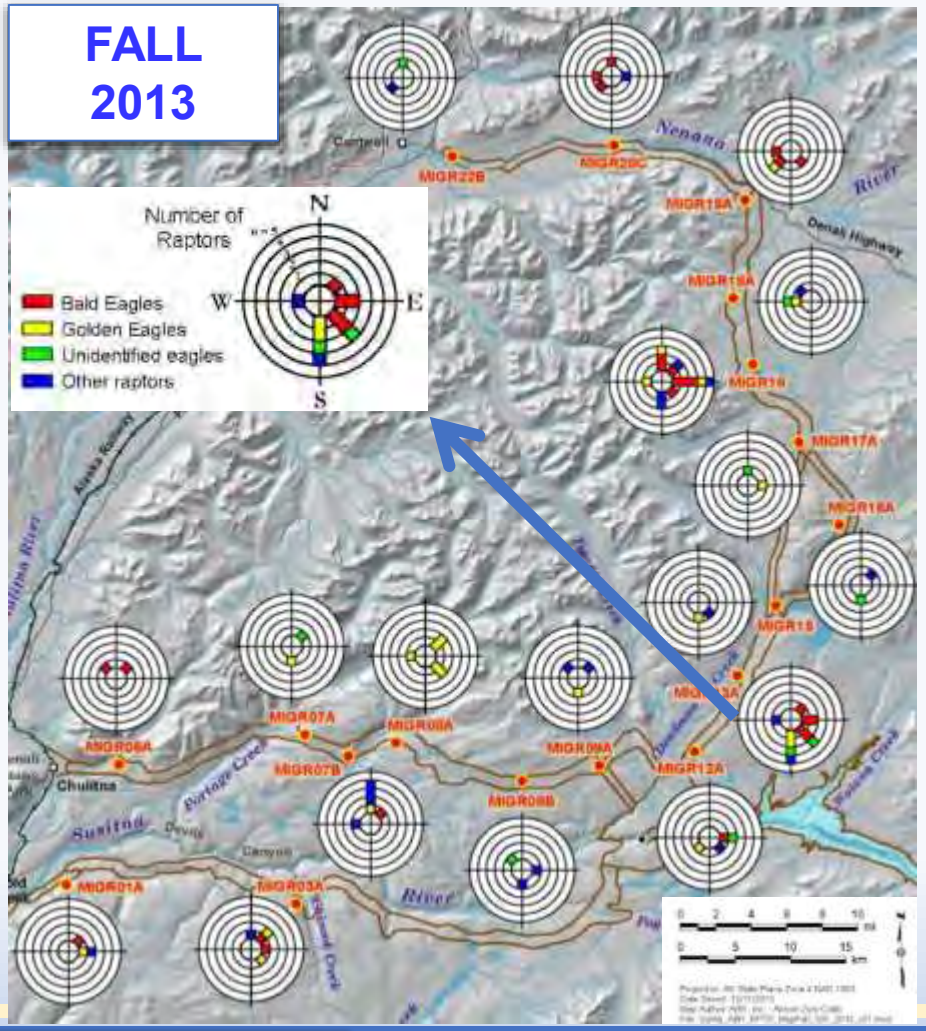


Study 10.14 Summary of Results in ISR

Raptor migration surveys focused on proposed transmission routes:

- Bald and Golden eagles were the most commonly detected species.
- Migration occurred over a broad area, with mostly random flight directions.





Study 10.14 Summary of Results in ISR

- Nest sightability surveys for eagles:
  - Several nest structures were located that were not found on primary surveys.
  - Sightability correction factor suggested that the majority of nests have been found after multiple surveys.
- Woodland raptor surveys (within proposed reservoir zone):
  - Very low nest density (4 nests).
    - No nests detected on normal-intensity transects.
    - 3 nests detected within high-intensity plots, 1 detected on winter survey.
  - Steep terrain complicated survey and decreased sightability.
    - **Suggests modification of methods to higher intensity.**
- Foraging and communal roosting surveys (fall and early winter 2012–2013):
  - Small numbers of Bald Eagles in late fall.
  - No communal roosts or winter foraging areas were located.
- Nesting habitat for eagles was mapped in field and with remote sensing/GIS:
  - This analysis will be used to help delineate potential breeding/foraging habitat.

AEA Proposed Modifications to Study 10.14 in ISR

(ISR Part C – Section 7.1.2)

- **AEA added the Denali East Option** road and transmission corridor to the study area:
  - 3-mi buffer from the center lines of the new road and transmission alignments.
  - Surveyed in 2014.
- The **mercury analysis objectives and methods have been consolidated under Study 5.7** (Mercury Assessment and Potential for Bioaccumulation).
- The **woodland raptor survey intensity will be increased**:
  - Both observers on the same side of the aircraft looking into the slope.
  - Survey twice as many transect lines.
  - Decrease transect spacing from 400 m to 200 m.
  - Reduce the coverage to 50 percent of the 2013 study area; select sample of blocks to survey.

New Modifications to Study 10.14 since ISR

- The Chulitna Corridor was dropped from the study area in 2014.
- The eagle foraging and communal roosting surveys will be dropped in 2015:
  - These surveys were conducted for two complete seasons (fall/early winter 2012–2013).
  - No major concentration areas were identified.

Current Status 10.14

- In 2014, only nest occupancy and productivity surveys were performed:
  - Surveys were modified in response to corridor changes.
  - Provided raptor nest avoidance information to reduce disturbance.
  - Provided the Project with another year of data for permitting.
- The Study Plan objectives are scheduled for completion in 2015 (except eagle foraging and roost surveys in fall/early winter which have been completed).

Steps to Complete Study 10.14

(ISR Part C – Section 7.1)

To complete the study, the study team will conduct the sampling required to fulfill the Study Plan objectives:

- Raptor nest occupancy and productivity surveys, including woodland raptor surveys.
- Sightability assessment of raptor nesting surveys.
- Delineation of Bald and Golden eagle nesting habitats.
- Spring and fall migration surveys along potential power transmission routes.

Licensing Participants' Proposed Modifications to Study 10.14?

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 10.16 Landbird and Shorebird Migration, Breeding, and Habitat Use

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 10.16 Objectives

- Collect current data on the **distribution, abundance, and habitat use of breeding landbirds and shorebirds**
- Study area is the proposed dam site/infrastructure area, the reservoir, and along the possible transmission line/road corridors
- Identify **habitat associations** for landbirds and shorebirds (*after the final year of study in 2015*)
- Evaluate **changes in distribution, abundance, and habitat use** of landbirds and shorebirds by comparison with historical data collected in the 1980s (*after the final year of study in 2015*)
- Characterize the migration of landbirds and shorebirds through the proposed dam and camp facilities area (*conducted as part of ISR Study 10.15, Waterbird Migration, Breeding, and Habitat Use*)
- Data will be used to assess impacts on landbirds and shorebirds from construction and operation of the proposed Project

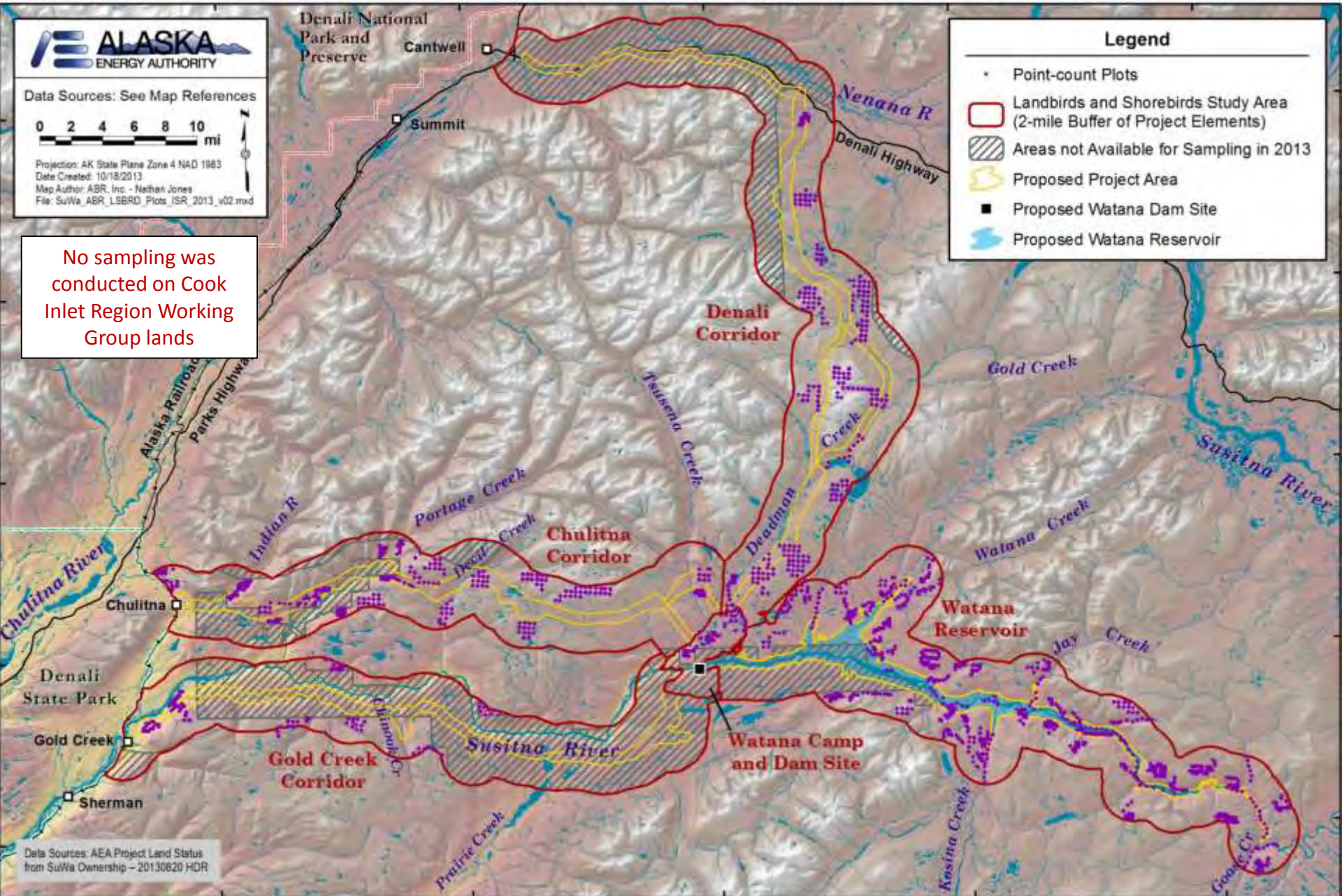
Study 10.16 Components

- Point-count surveys for breeding landbirds and shorebirds in all available habitats (ISR Part A, Section 4.1, p. 3)
- Focused transect surveys in riverine and lacustrine habitats (ISR Part A, Section 4.2, p. 11)
- Surveys of nesting swallow colonies in reservoir inundation zone (ISR Part A, Section 4.3, p. 13)
- Migration survey (ISR Part A, Section 4.4, p. 14; *conducted as part of ISR Study 10.15, Waterbird Migration, Breeding, and Habitat Use*)
- Comparison of results with historical data (ISR Part A, Section 4.5, p. 15; *to be conducted after the final year of study in 2015*)
- Mercury assessment support (ISR Part A, Section 4.6, p. 15; *now part of ISR Study 5.7, Mercury Assessment and Potential for Bioaccumulation*)

Study 10.16 Variances

- **Point-count plot locations were selected using an alternative, stratified random/systematic method** (ISR Part A, Section 4.1.1.1); mirrors method used in the Alaska Landbird Monitoring Survey.
- 2013 study area was about 12% smaller than in the Study Plan because the strata used in the plot-allocation method did not cover the entire study area (ISR Part A, Section 4.1.1.1); unsampled areas were surveyed in 2014 and will be surveyed for a second season in 2015.
- No surveys were authorized on CIRWG lands in 2013, which further restricted the 2013 study area by about 27% (ISR Part A, Section 4.1.1.1); unsampled CIRWG lands were surveyed in 2014 and will be surveyed for a second season in 2015.
- **Helicopter platform used for colonially nesting swallow surveys resulted in both an increase in spatial coverage and survey efficiency** (ISR Part A, Section 4.3.1).
- **Study area for colonially nesting swallows now includes a 2-mi buffer surrounding the proposed reservoir, dam, and camp** (ISR Part A, Section 4.3.1).
- Comparisons of current and historical (1980s APA Project) data on landbirds and shorebirds will be made in the USR after data from all years of study are available (ISR Part A, Section 4.5.1).

Study 10.16 Summary of Results in ISR (ISR Part A – Section 5)



Study 10.16 Summary of Results in ISR (ISR Part A – Section 5)

Point-count surveys results, May and June 2013:

- **Landbirds: 53 species recorded**. The 8 most commonly observed species (59% of landbird records) were Fox Sparrow, White-crowned Sparrow, Common Redpoll, Yellow-rumped Warbler, Varied Thrush, Savannah Sparrow, Ruby-crowned Kinglet, and American Tree Sparrow.
- Sufficient data were available and preliminary study-area-wide density estimates were calculated for 38 of the 53 (72%) landbird species recorded.

- **Shorebirds: 11 species recorded**. The most commonly observed species (84% of shorebird records) were Wilson's Snipe, Spotted Sandpiper (mostly on riverine plots), American Golden-Plover, and Lesser Yellowlegs.
- Insufficient data were available to calculate density estimates for any shorebird species.

Study 10.16 Summary of Results in ISR (ISR Part A – Section 5)

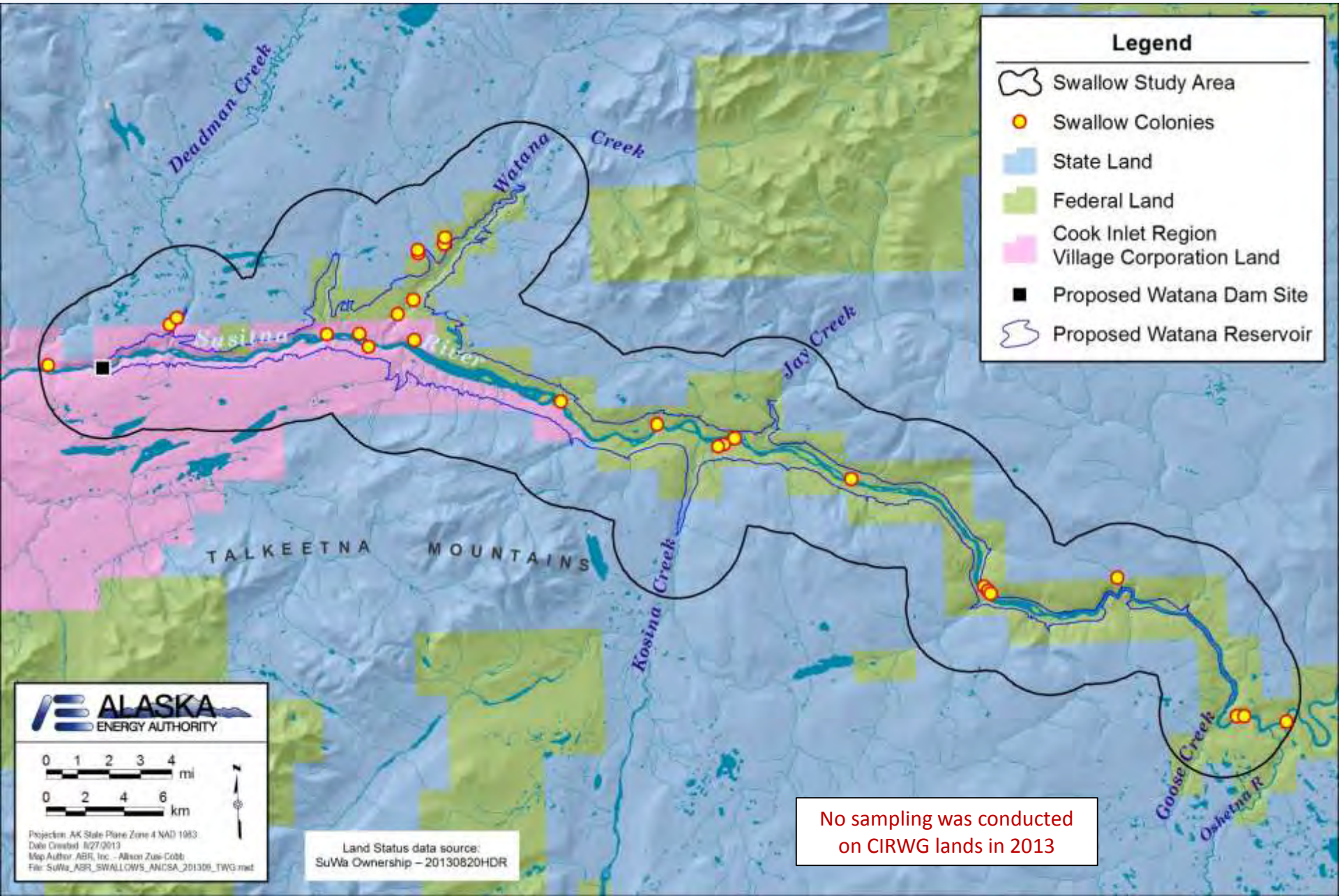
Riverine survey results, May and June 2013:

- Common landbirds: Blackpoll Warbler, Wilson's Warbler, Fox Sparrow, and Northern Waterthrush in vegetated riparian habitats, accounted for nearly 43 % of landbird detections.
- Common shorebird: Spotted Sandpiper accounted for 98% of shorebird observations.

Lacustrine survey results, May and June 2013:

- Common landbirds: American Robin, Rusty Blackbird, Bohemian Waxwing, and Savannah Sparrow in lacustrine margins and adjacent habitats, accounted for nearly 50% of landbird detections.
- Common shorebirds: Red-necked Phalarope (25% of shorebird observations). Wilson's Snipe, Lesser Yellowlegs, and Least Sandpiper accounted for another 55% of shorebird observations.

Study 10.16 Summary of Results in ISR (ISR Part A – Section 5)



Study 10.16 Summary of Results in ISR (ISR Part A – Section 5)

Swallow colony survey results, July 2013:

- 26 swallow colonies were located in the area of the proposed Watana Reservoir plus the 2-mile study area buffer.
- Nearly all colonies were Bank Swallows, but two colonies were of mixed species (Bank Swallows and Violet-green Swallows).
- Colonies ranged in size from 1 to 354 burrows (average = 37 burrows).

Study 10.16 Summary of Results since ISR

- In May and June 2014, point-count, riverine- and lacustrine-focused surveys were conducted throughout the revised study area (included all areas not surveyed in 2013 and the new Denali Corridor East Option).

- Surveys were not conducted in the Chulitna Corridor, which has been dropped from further consideration.

- Data analysis and study results will be prepared for presentation in the USR.

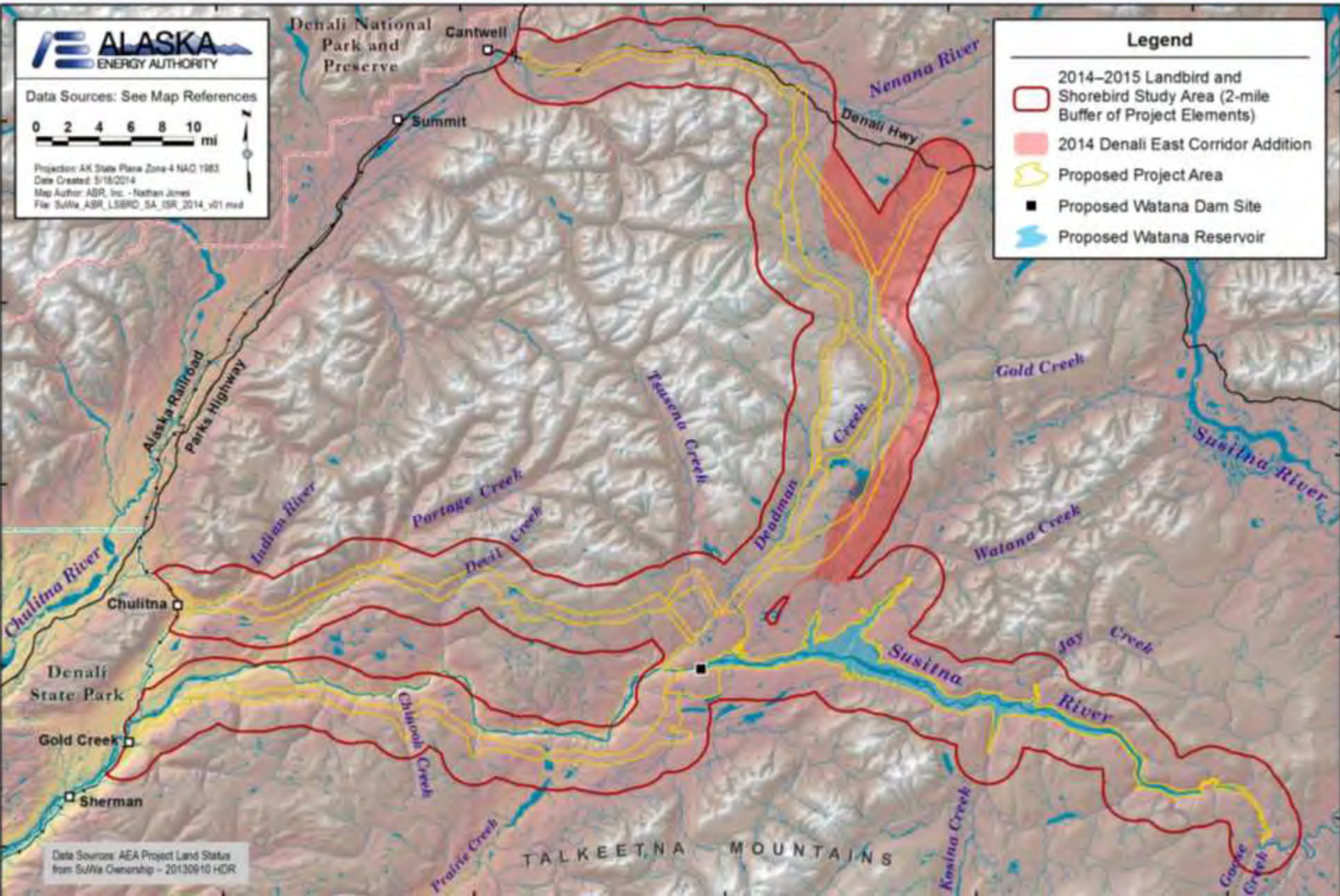
AEA Proposed Modifications to Study 10.16 in ISR (ISR Part C – Section 7.1.2)

- These four modifications (described above under Variances) were implemented in 2013 and will be carried forward to complete the study:
  - An unbiased, stratified random/systematic sampling procedure is used to determine locations of point-count plots.
  - Colonial nesting swallow surveys now employ a helicopter survey platform to increase survey coverage and efficiency.
  - Colonial nesting swallow survey study area expanded to incorporate a 2-mile buffer surrounding the proposed reservoir, dam, and camp.
  - Comparisons of current and historical (1980s APA Project) data on landbirds and shorebirds will be presented in the USR after data from all years of study are available.

AEA Proposed Modifications to Study 10.16 in ISR (ISR Part C – Section 7.1.2)

- AEA added the alternative Denali East Option road and transmission line corridor to the study area; for this study, the new corridor includes a 2-mi buffer surrounding the road and transmission line alignments for the Denali East Option.
- Point-count plots included on the riverine transect surveys in 2013 will be dropped because stream noise inhibited the acquisition of accurate point-count data in vegetated riparian habitats.
- The new bird abundance metric for riverine-focused surveys will be linear densities (birds per km of stream length); for lacustrine-focused surveys, the new abundance metric will be the total number of birds recorded.
- Work in support of Study 5.7 (Mercury Assessment and Potential for Bioaccumulation) has been consolidated under that study.

AEA Proposed Revision to Study Area (ISR Part C – Section 7.1.2)



New Modification to Study 10.16 since ISR

- Distance sampling techniques for line transects were incorporated in the riverine transect surveys in 2014 to allow the possibility of estimating densities for landbirds and shorebirds using riverine habitats. Similar to densities derived from point-count data, the resulting densities would be corrected for detectability. Additional field time required to record angle and distance data was negligible and did not reduce the lengths of stream segments surveyed.
- Applies only to birds using shoreline habitats and riverine waters. Landbirds in vegetated riparian habitats are recorded by a second observer to allow the estimation of linear densities (birds/km of stream length); these landbird densities will be uncorrected for detectability as is the case with the riverine transect data collected in 2013.
- The Chulitna Corridor has been dropped from the study area.

Current Status Study 10.16

- In 2013 and 2014, field surveys were completed as described in the RSP (Section 10.16.4.1.2) and with the implementation of the variances and modifications described in the ISR. Some areas were not surveyed in 2013, but the full, revised study area was surveyed in 2014. The areas not surveyed in 2013 will be surveyed for a second season in 2015.
- In both study years, many more point-count plots were surveyed than the goal of 800 per year listed in the RSP (Section 10.16.8): in 2013 and 2014, respectively, 1,365 and 1,209 point counts were completed.
- Riverine- and lacustrine-focused surveys were completed in both years as described in the RSP (Section 10.16.4.2) and with the implementation of the modifications described in the ISR and in this presentation.
- Swallow colony surveys were completed in a larger study area in 2013 and with greater efficiency than as planned in the RSP (Section 10.16.4.3); the second year of swallow colony surveys will be completed in 2015.
- Overall, the study is on track to fully meet the study objectives.

Steps to Complete Study 10.16 (ISR Part C – Section 7.1)

- Point-count and Transect Surveys:
  - Repeat intensive sampling in May and June of 2014 and 2015 in the revised study area, including point counts in all available habitats plus riverine- and lacustrine-focused surveys; previously inaccessible/unsurveyed lands will be sampled in two years (2014 and 2015).
- Estimation of Breeding Population Densities:
  - Conduct removal and distance analyses using the combined 2013–2015 point-count data set to correct for detectability and calculate density estimates and total estimated birds occurring in various Project subdivisions within the study area (e.g., buffers of each of the proposed Project components).
- Habitat-use Analyses:
  - Conduct habitat-use analyses, based on the final mapped wildlife habitat types, to facilitate work on the Evaluation of Wildlife Habitat Use (RSP 10.19).
- Swallow Colony Survey:
  - Repeat helicopter-based survey(s) in July 2015 in reservoir inundation zone plus buffer, reexamining colonies found in 2013 and searching for more.
- Each of these tasks will be accomplished as described in the ISR.

Licensing Participants' Proposed Modifications to Study 10.16?

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 10.5 Moose Distribution, Abundance, Movements, Productivity, and Survival

October 21, 2014

Prepared by

Alaska Department of Fish and Game

Study 10.5 Objectives

- Document the moose population and composition in the study area.
- Assess the relative importance of the habitat in the proposed inundation zone, access/transmission corridors, and riparian area downstream from the proposed dam.
- Document the productivity and calf survival of moose using the study area.
- Document the level of late-winter use of the proposed inundation zone by adults and calves.
- Document moose browse utilization in and adjacent to the proposed inundation zone and the riparian area downstream from the proposed dam.
- Document the amount of habitat potentially available for improvement through enhancement.
- Analyze and synthesize data from historical and current studies of moose as a continuation of the 2012 big-game distribution and movements study.

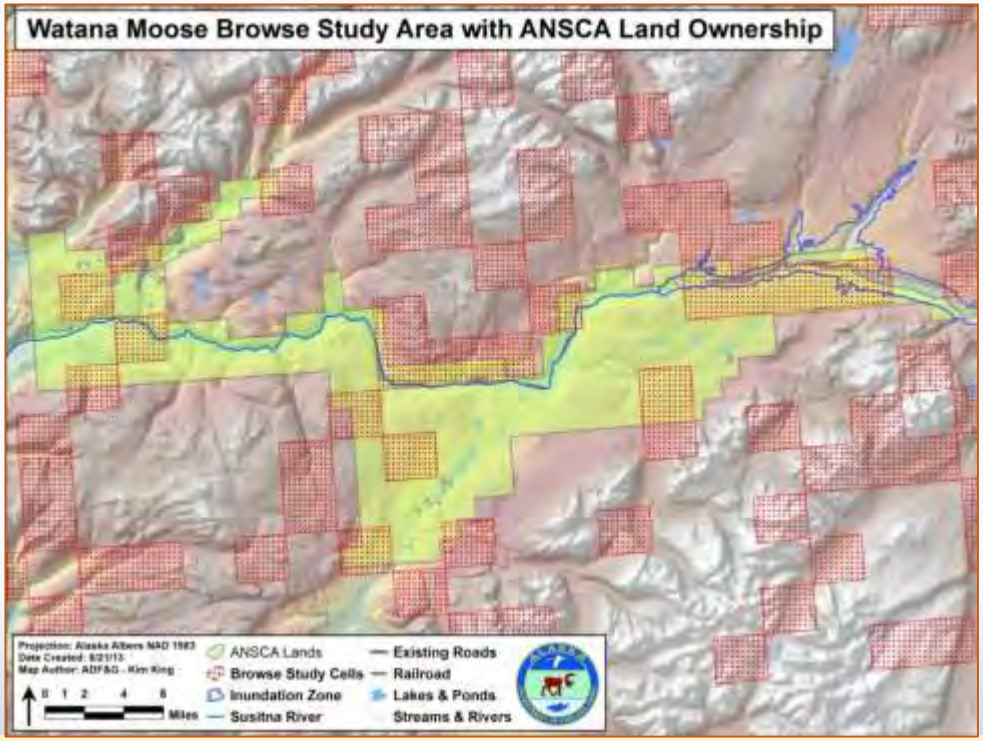
Study 10.5 Components

- **Moose Distribution, Movements, Productivity, and Survival**
  (ISR Part A, Section 4.1, pg 2)
- **Population Monitoring** (ISR Part A, Section 4.2, pg 3)
- **Moose Browse Survey and Habitat Assessment**
  (ISR Part A, Section 4.3, pg 4)

Study 10.5 Variances

Browse survey methods (RSP Section 10.5.4.3) varied in 2013:

- Randomly chosen cells on Cook Inlet Regional Working Group (CIRWG) lands were unavailable for sampling in 2013.
- **Flexibility of the browse survey methods allowed the study team to work around those lands and still meet the study objectives.** (ISR Part A, Section 4.3.1; Table 4.3-1)



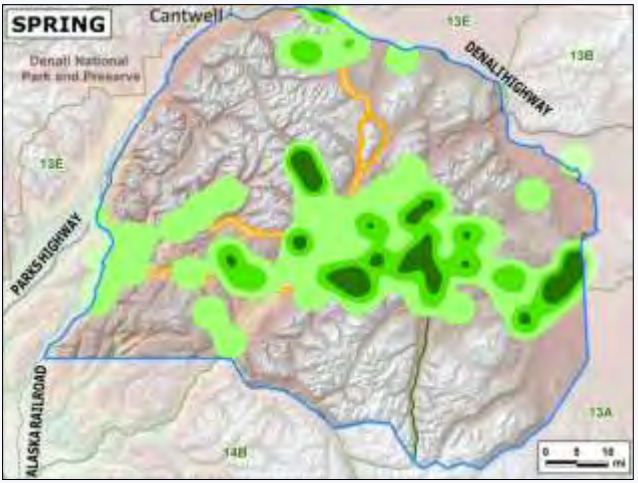
Study 10.5 Summary of Results in ISR (ISR Part A – Section 5)

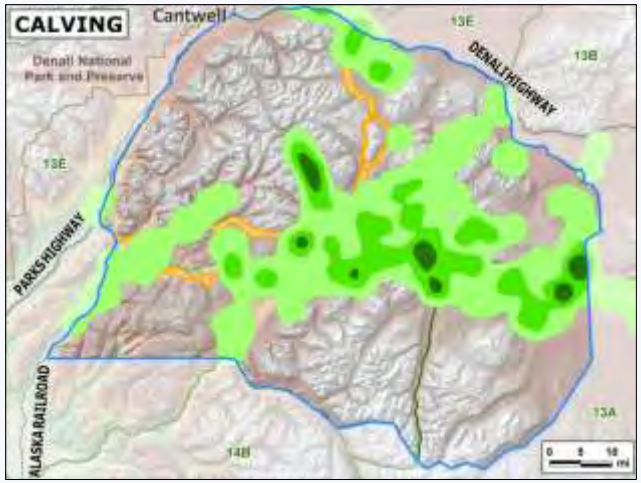
100 VHF and GPS moose collars have been deployed in the study area (ISR Table 5.1-1).

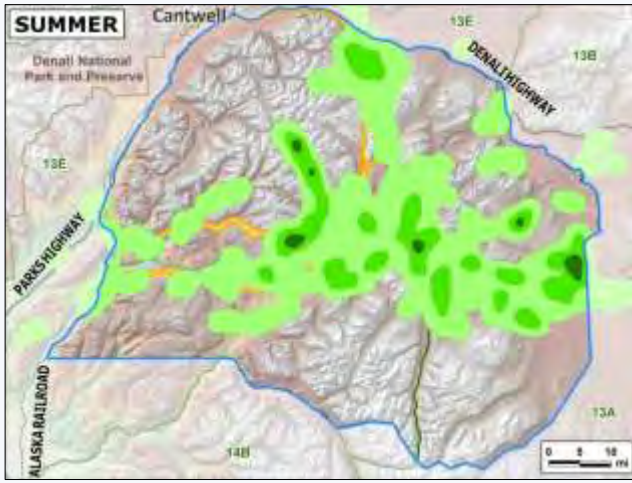
Collar Type	Sex	Oct 2012	Mar 2013	Total
VHF	Bulls	3	17	20
	Cows	7	33	40
GPS	Bulls	14	0	14
	Cows	26	0	26
TOTAL		50	50	100

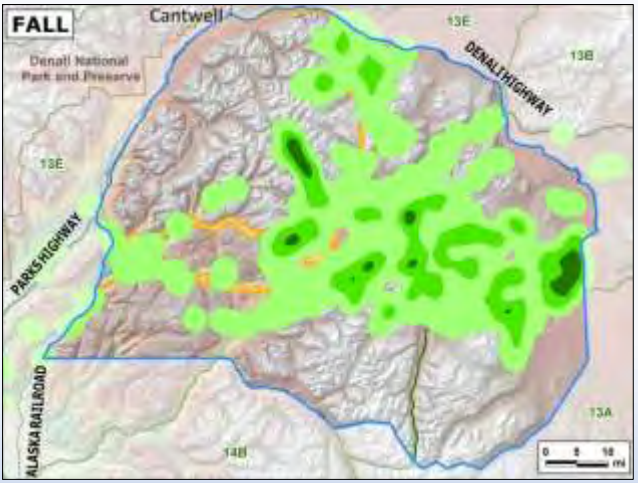
Study 10.5 Summary of Results in ISR (ISR Part A – Section 5)

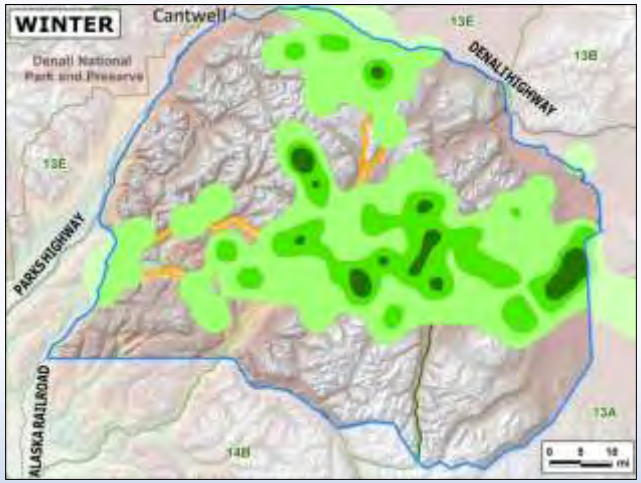
VHF- and GPS-collared Moose Locations, Oct 2012–Sep 2013 (ISR Figure 5.1-1)

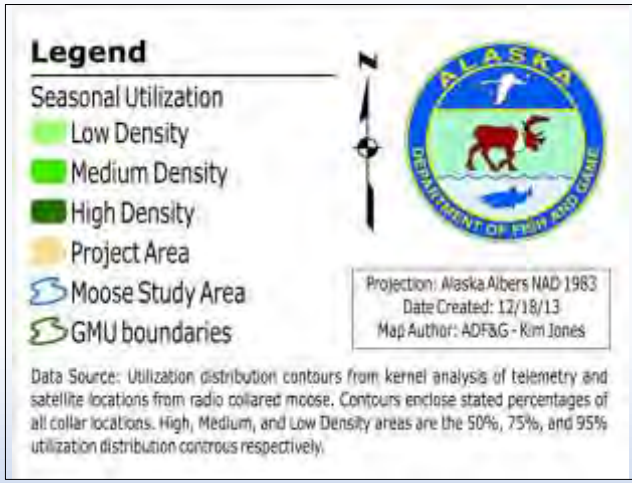








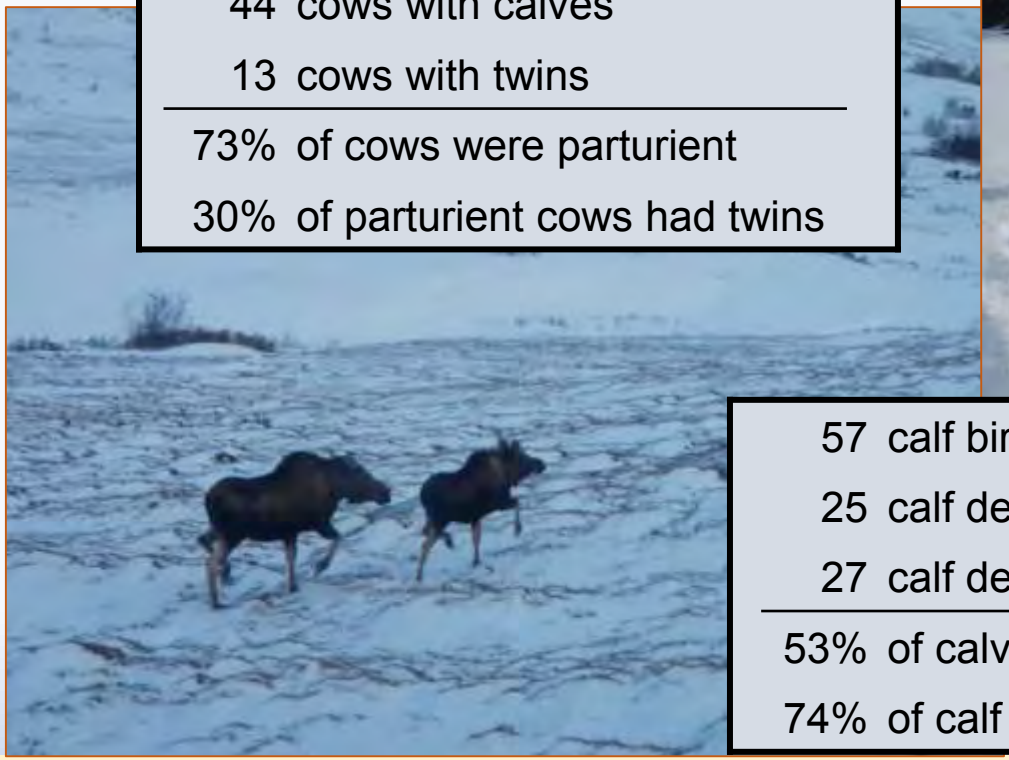




Study 10.5 Summary of Results in ISR (ISR Part A – Section 5)

Twinning and calf survival rates were assessed using daily twinning surveys.

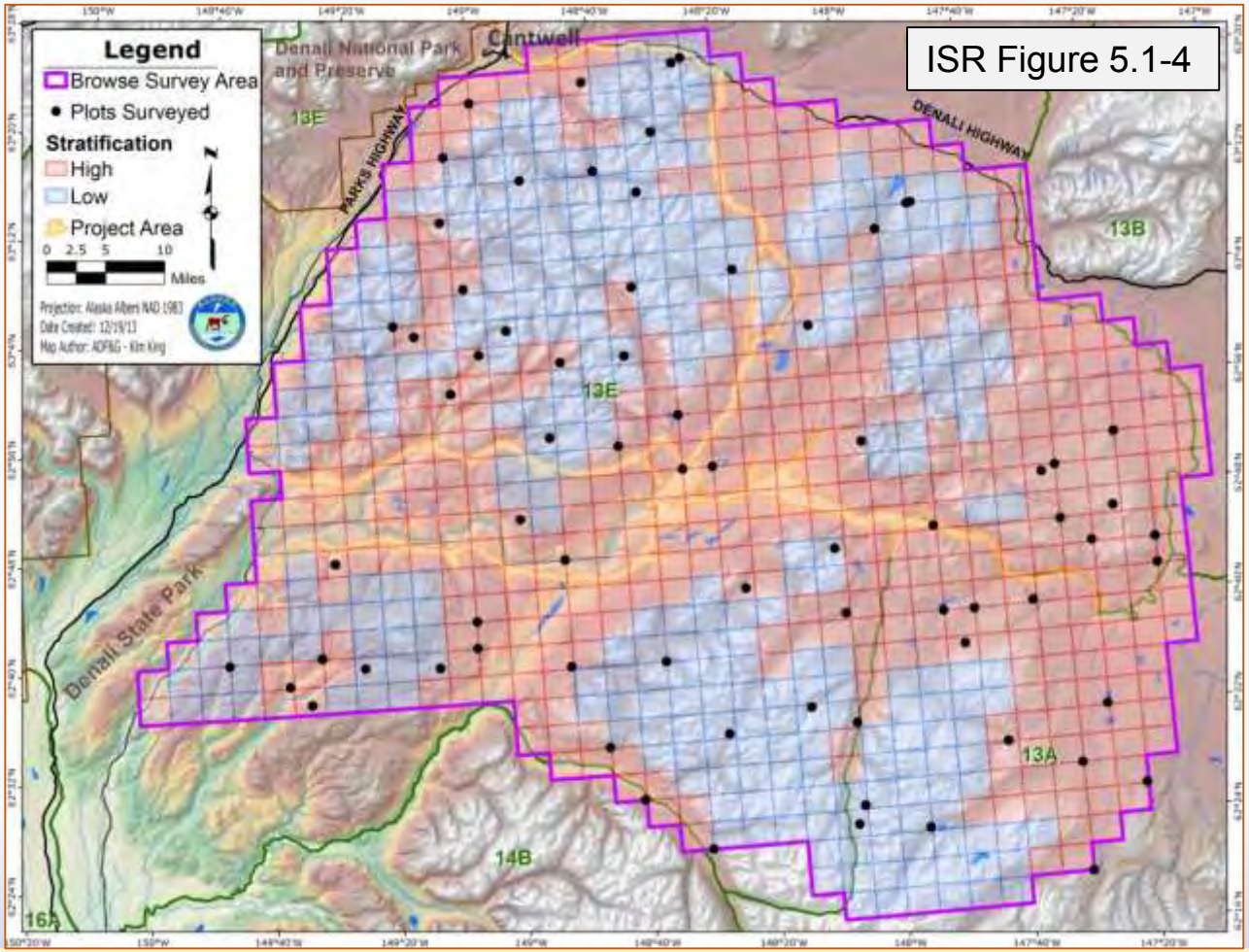
60	cows located
57	calves born
44	cows with calves
13	cows with twins
73%	of cows were parturient
30%	of parturient cows had twins



57	calf births
25	calf deaths by June 10
27	calf deaths by July 1
53%	of calves survived to July 1
74%	of calf deaths within 1st week of observation

Study 10.5 Summary of Results in ISR (ISR Part A – Section 5)

A browse survey was conducted in the study area in March 2013.



ISR Figure 5.1-4

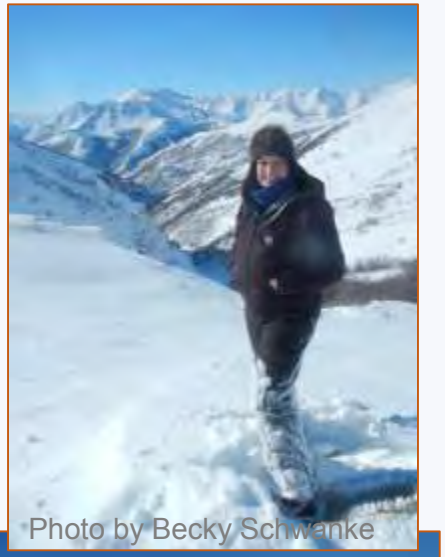
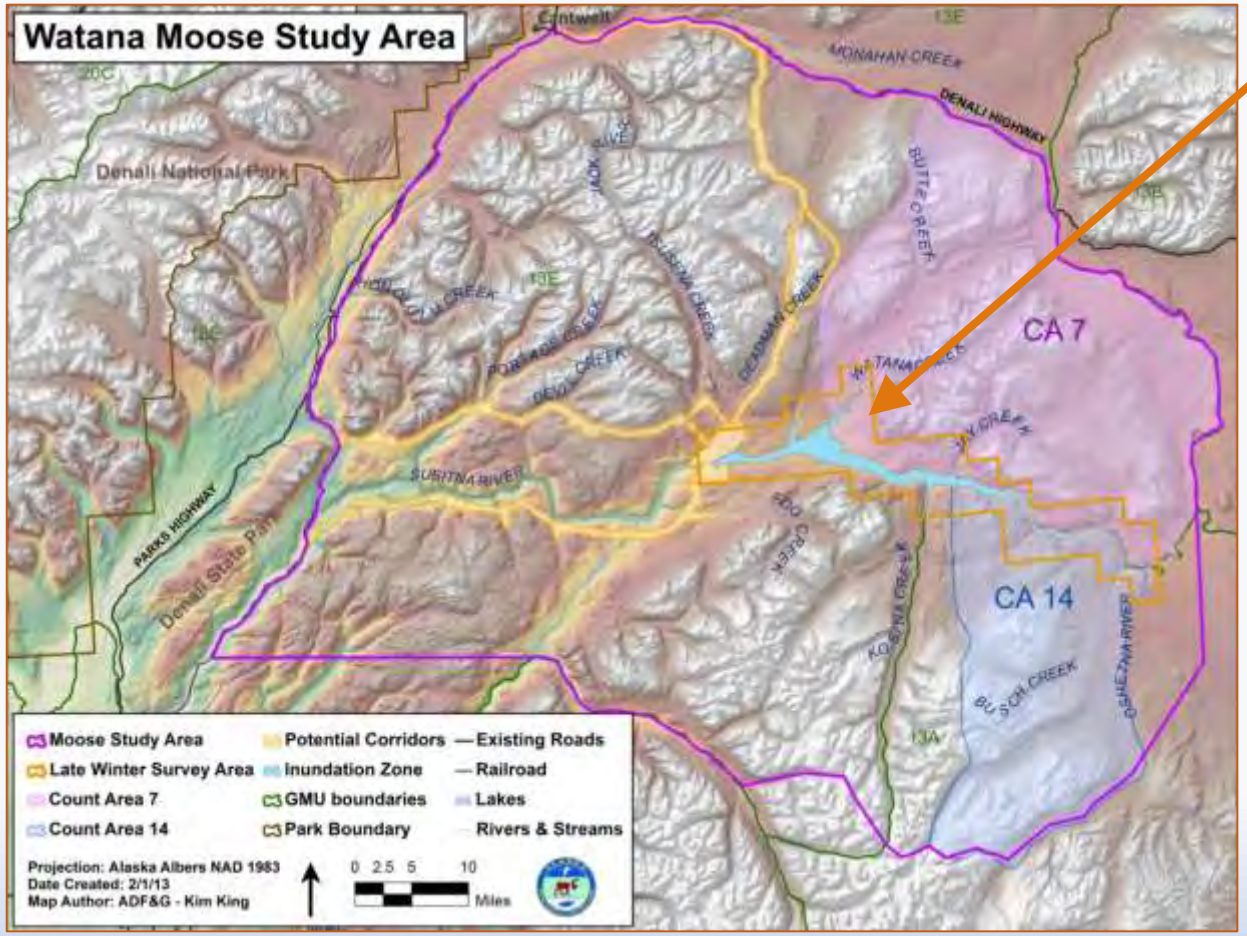


Photo by Becky Schwanke

Photo by Kim Jones ADF&G

Study 10.5 Summary of Results since ISR

Late-winter surveys were conducted in the proposed Watana Reservoir inundation zone in March 2012 and 2013.



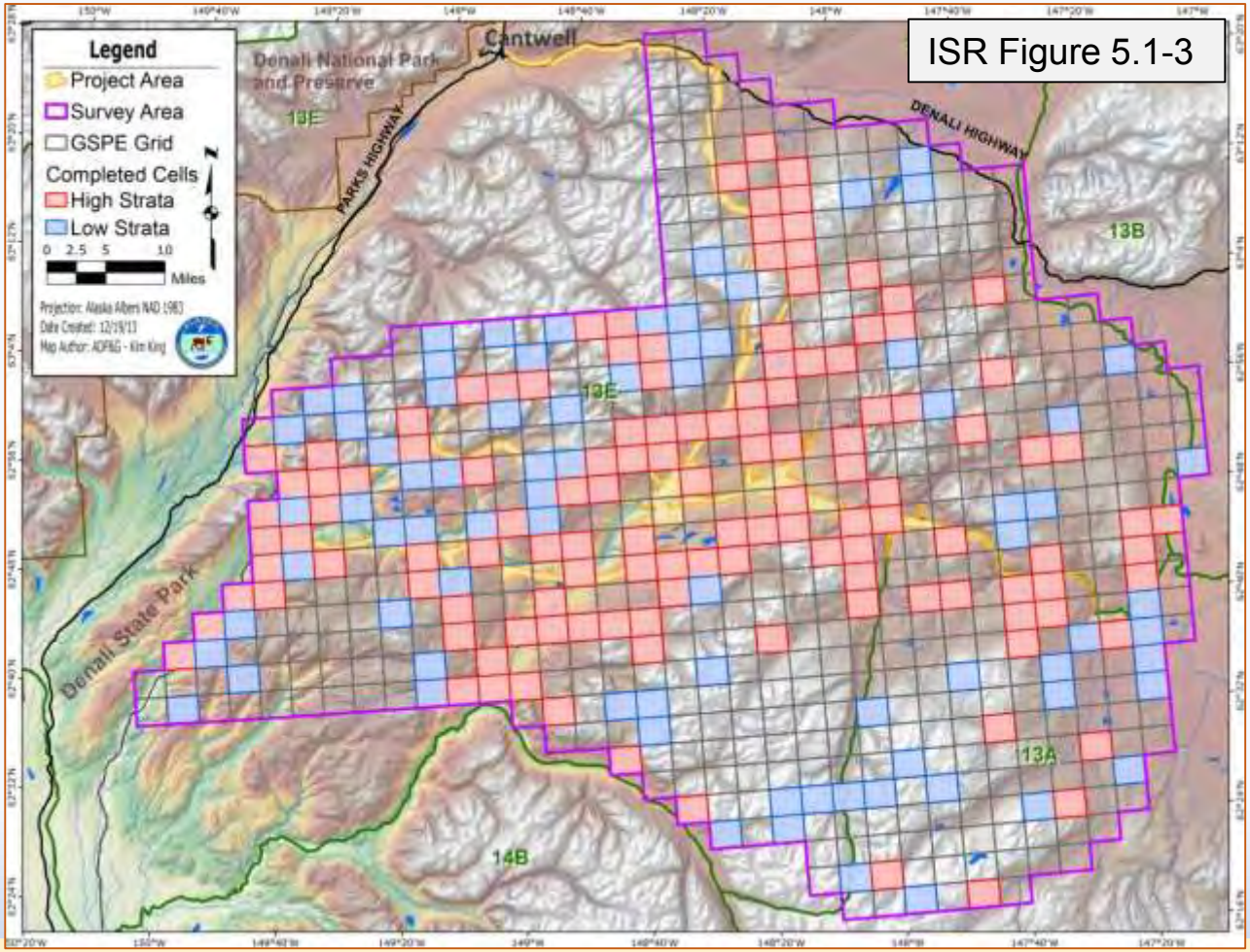
Survey Results

2012: 481 ± 26 (1.97 moose/mi^2)

2013: 502 ± 26 (2.06 moose/mi^2)

Study 10.5 Summary of Results since ISR

A GeoSpatial Population Estimator (GSPE) survey was conducted in the study area in November 2013.



Survey Results

3,683 ± 274 with SCF = 1.25

(0.95 moose/mi²)

AEA Proposed Modifications to Study 10.5 in ISR (ISR Part C – Section 7)

- AEA will forego monthly radio-tracking flights of VHF-collared moose in winter months (December, January, February, April). Because little movement occurs during these months, monitoring during this period is not needed to meet study objectives (Section 7.1.2).
- Another late-winter inundation-zone survey will be completed in March 2015.
- Fine-scale browse assessment will be completed in March 2015 (Section 7.2).

New Modifications to Study 10.5 since ISR

ADF&G proposes and AEA supports the following modification:

- Moose telemetry flights will continue in 2015.

Steps to Complete Study 10.5 (ISR Part C – Section 7.1)

To complete this study, AEA will implement the methods described in the RSP. These activities include the following:

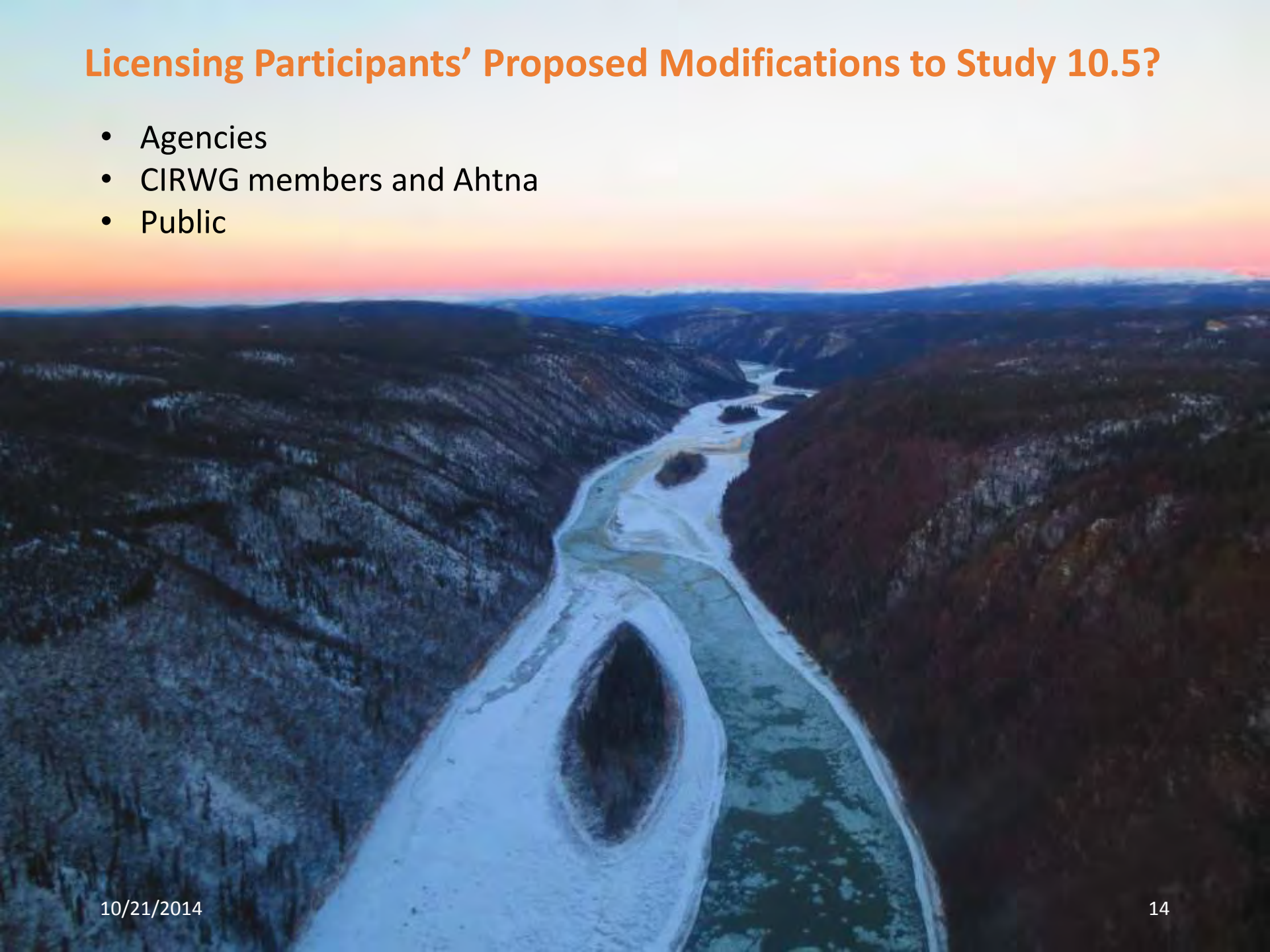
- Continue monitoring moose distribution, movements, productivity, and survival (RSP Section 10.5.4.1).
- Population monitoring (RSP Section 10.5.4.2).
- Moose browse survey and habitat assessment (RSP Section 10.5.4.3).


Photo by Kim Jones ADF&G


Photo by Kim Jones ADF&G

Licensing Participants' Proposed Modifications to Study 10.5?

- Agencies
- CIRWG members and Ahtna
- Public



Initial Study Report Meeting

Study 10.6 Caribou Distribution, Abundance, Movements, Productivity, and Survival

October 21, 2014

Prepared by

Kimberly King Jones

Alaska Department of Fish and Game

Study 10.6 Objectives (ISR Part A, Section 2)

- Document seasonal use of and movement through the Project area by both females and males of the Nelchina caribou herd (NCH) and the Delta caribou herd (DCH)
- Assess the relative importance of the Project area to both the NCH and DCH
- Document productivity and survival of caribou using the Project area
- Analyze data from historical caribou studies and synthesize with recent data for the NCH and DCH, as a continuation of the caribou task of the 2012 study

Study 10.6 Components

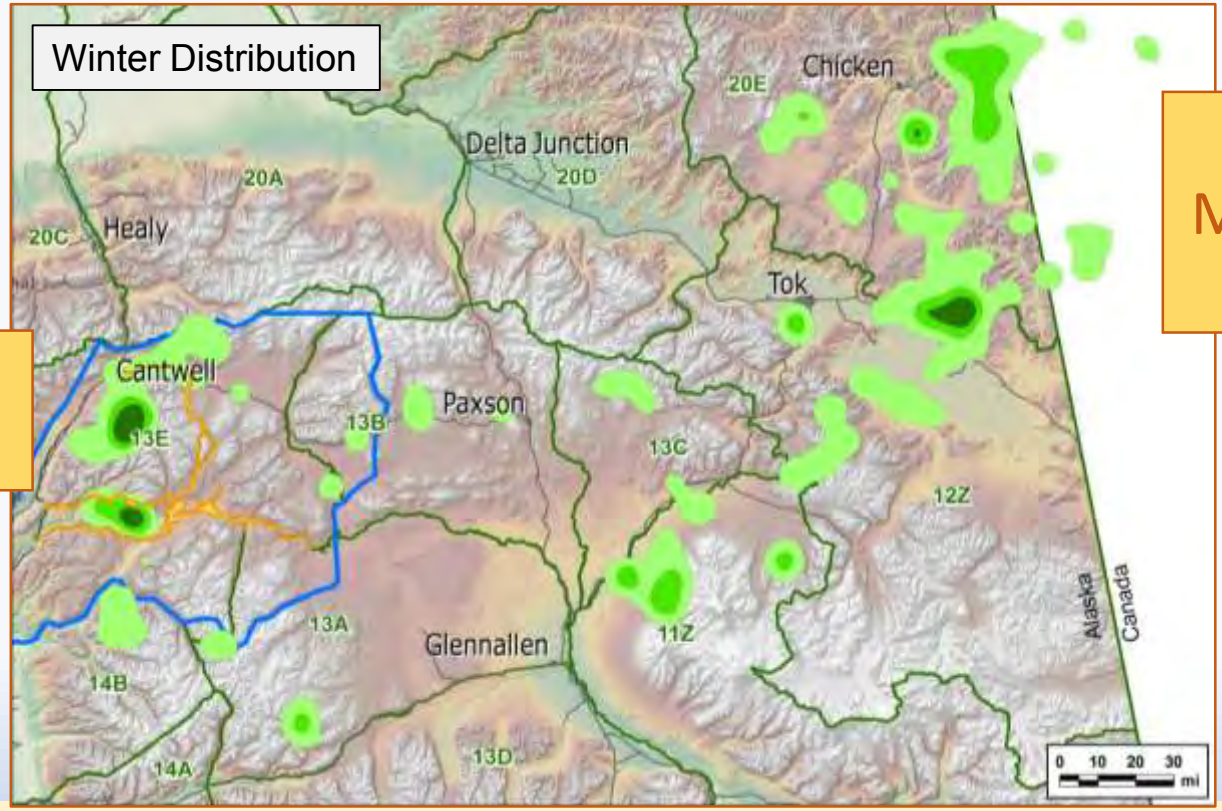
- Radio Collar Deployment (ISR Part A, Section 4.1, pg 2)
- VHF Telemetry Surveys (ISR Part A, Section 4.2, pg 3)
- GPS Collar Monitoring (ISR Part A, Section 4.3, pg 4)
- Data Analysis (ISR Part A, Section 4.4, pg 4)

Study 10.6 Variances

The study plan (RSP Section 10.6.4) proposed that 2/3 of radio collars be deployed on Nelchina Herd caribou and 1/3 on Delta Herd caribou.

- Herd designation is not clear based solely on capture location.
- **Caribou have been classified into two groups based on wintering strategies and capture locations** (ISR Part A, Section 4.1.1, pg 2).

Western Group



Eastern Migratory Group

Study 10.6 Variances

Telemetry flights were conducted twice weekly during peak calving to better track calf production and calf survival.

2013	Caribou Cow Parturition
128	cows located
84	cows parturient
39	calves lost
66%	of cows were parturient
46%	of calves lost

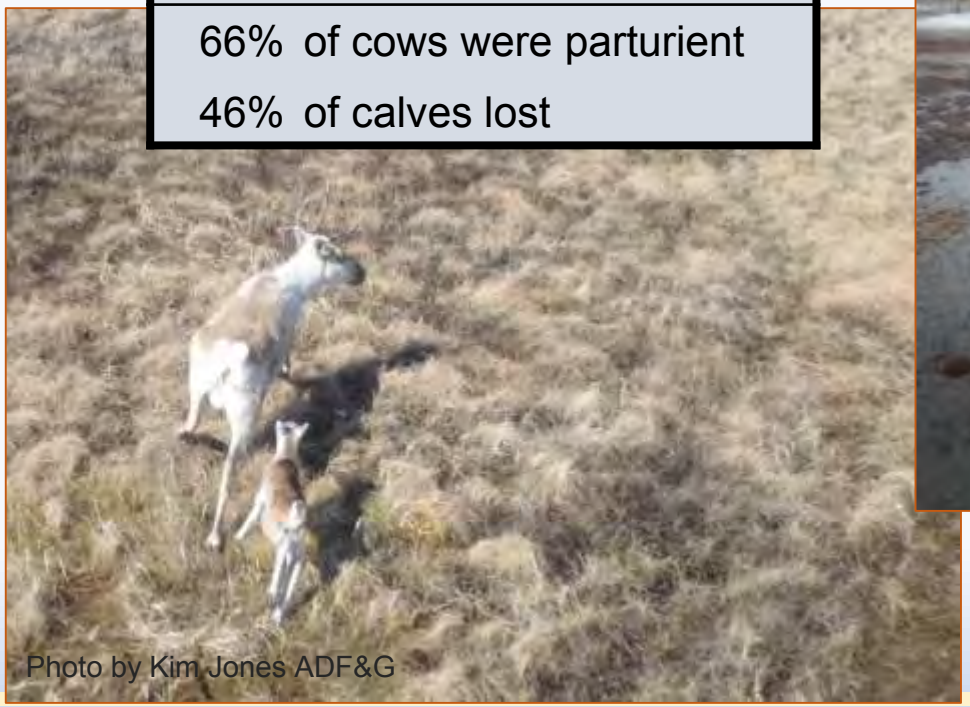


Photo by Kim Jones ADF&G


Photo by Kim Jones ADF&G

(ISR Part A, Section 5.2.1, pg 5)

Study 10.6 Summary of Results in ISR (ISR Part A – Section 5)

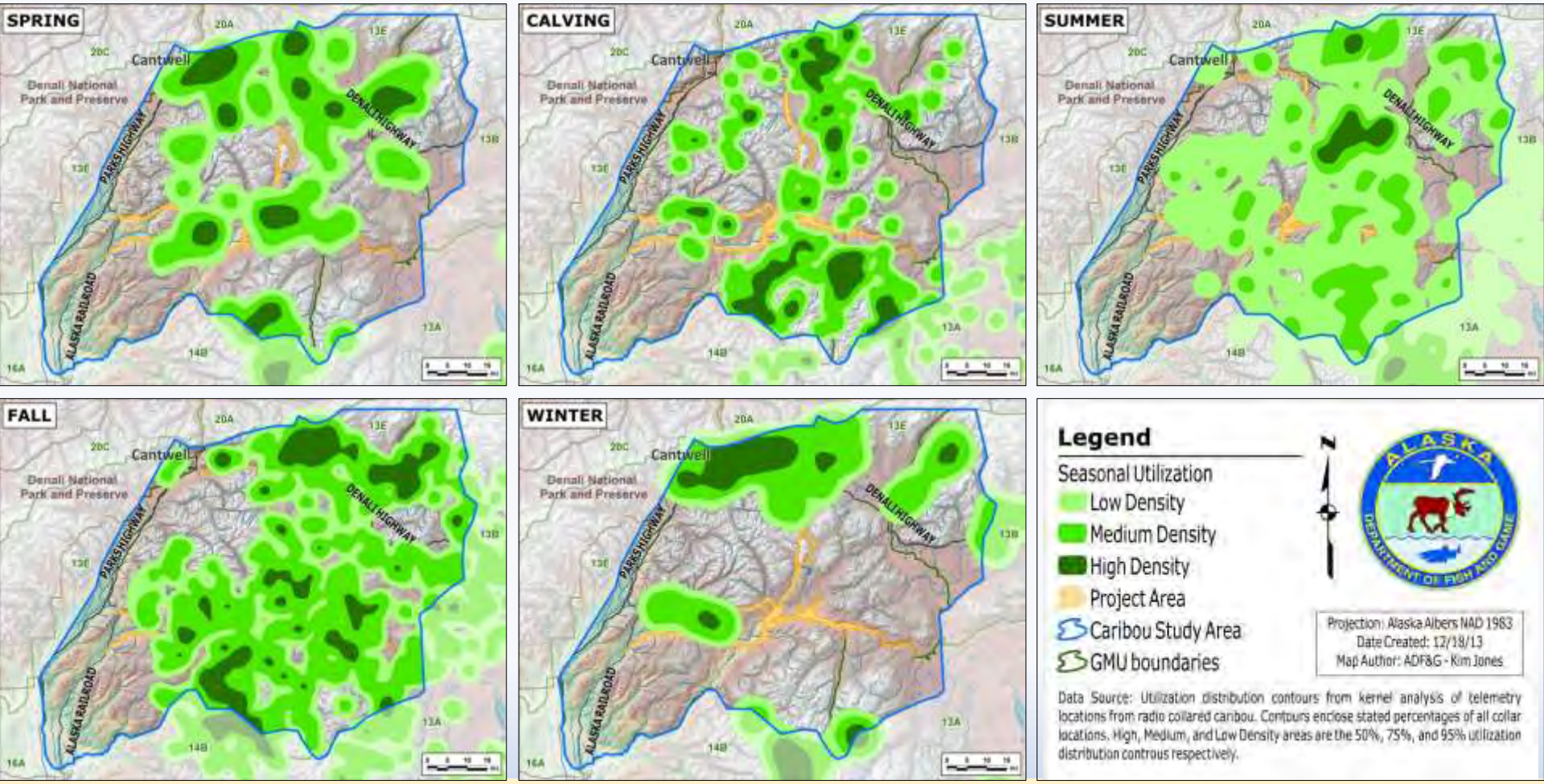
Caribou Captures 2012–2013						
Collar Type	Sex	Apr 2012	Oct 2012	Apr 2013	Oct 2013	Total
VHF	Bulls	15	15	9	1	40
	Cows	0	0	0	4	4
GPS	Bulls	8	10	9	2	29
	Cows	0	42	1	5	48
TOTAL		**23**	**67**	**19**	**12**	121

(ISR Part A, Section 5.1, pg 4; Table 5.1-1)

Photo by Kim Jones ADF&G

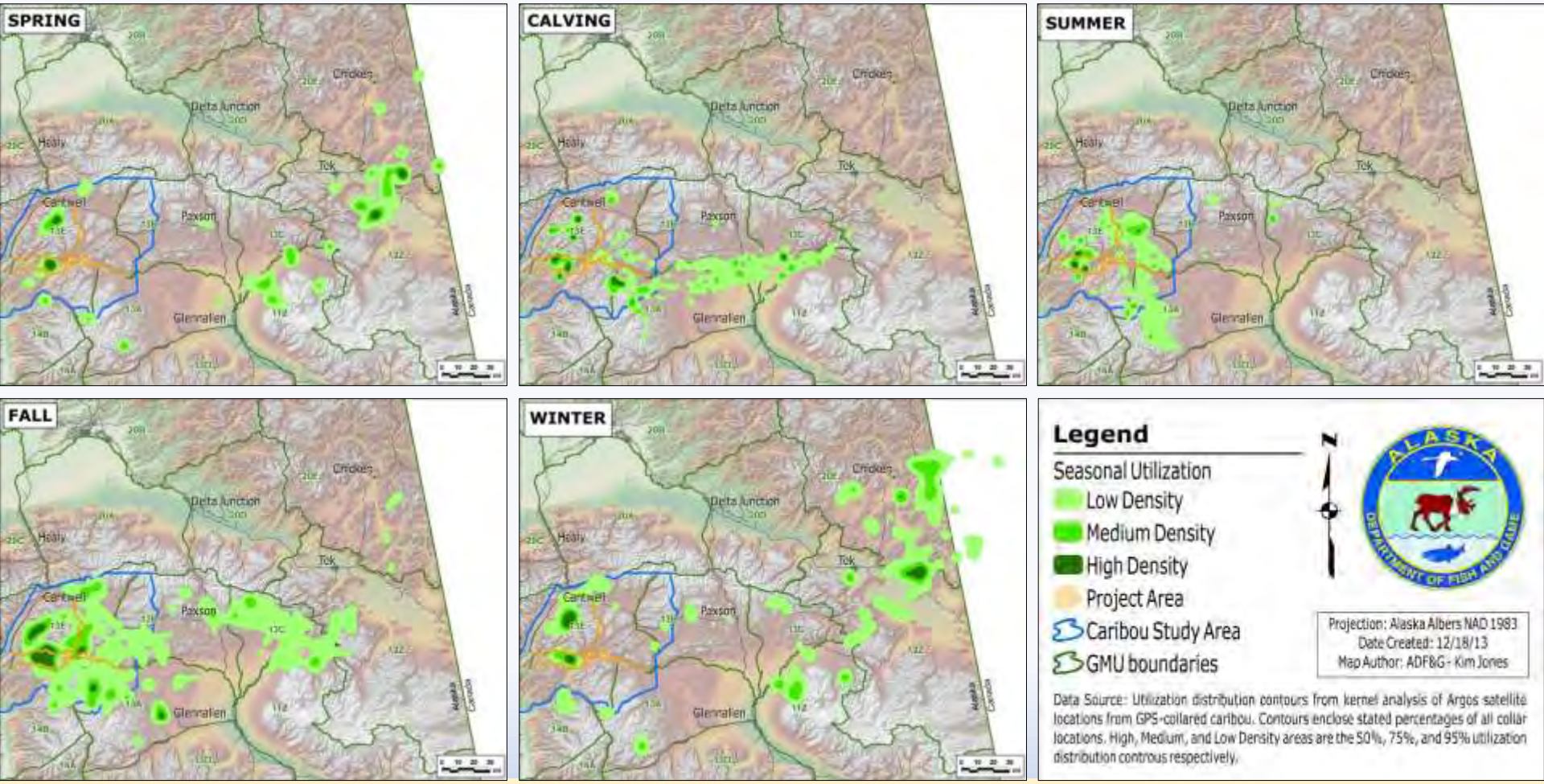
Study 10.6 Summary of Results in ISR (ISR Part A – Section 5)

VHF-Collared Caribou Locations, May 2012–September 2013
(ISR Part A, Section 5.3, pg 6; Fig 5.1-1)



Study 10.6 Summary of Results in ISR (ISR Part A – Section 5)

GPS-Collared Caribou Locations, May 2012–September 2013
(ISR Part A, Section 5.3, pg 6; Fig 5.1-2)



AEA Proposed Modifications to Study 10.6 in ISR (ISR Part C – Section 7.1.2)

Variances implemented in 2013 to be carried forward in 2014:

- Differentiation between the Eastern Migratory Group and the Western Group (ISR Part A, Section 4.1.1).
- Increased frequency of telemetry flights to twice weekly during peak calving (ISR Part B).

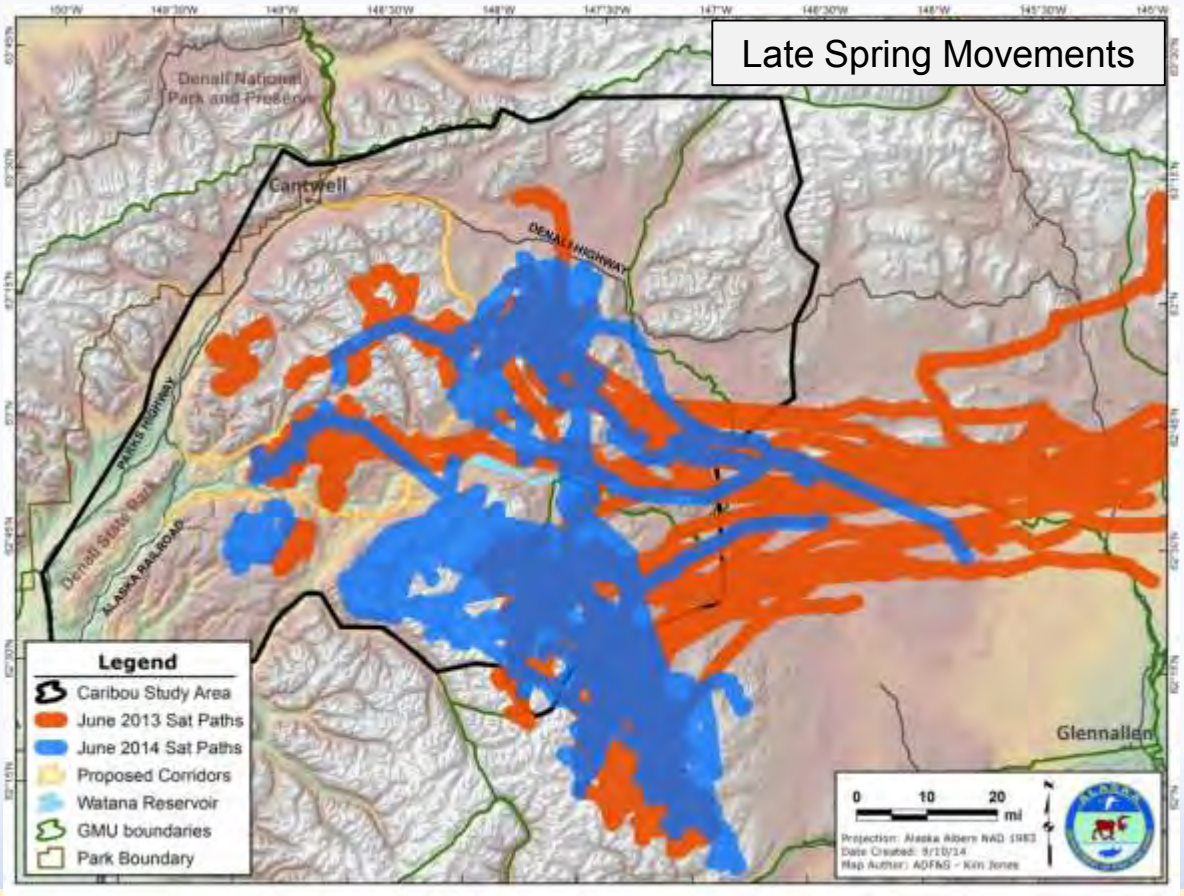
Photo by Nick Demma ADF&G

Photo by Lem Butler ADF&G

New Modifications to Study 10.6 since ISR

ADF&G proposes and AEA supports the following modifications:

- GPS collars retrieved in 2014 will be refurbished and redeployed in 2015.
- Radio-tracking flights will continue in 2015.



Steps to Complete Study 10.6 (ISR Part C – Section 7.1)

To complete this study, AEA will implement the methods in the Study Plan, with the modifications outlined.

These activities include the following:

- Continue telemetry flights and remove, refurbish, and redeploy GPS collars (RSP Section 10.6.4).
- Data analysis and evaluation of the distribution and movements of cows and bulls from each herd using GIS spatial analysis (RSP Section 10.6.4).


Photo by Kim Jones ADF&G

Photo by Kim Jones ADF&G

Licensing Participants' Proposed Modifications to Study 10.6?

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 10.7 Dall's Sheep Distribution and Abundance

October 21, 2014

Prepared by

Alaska Department of Fish and Game

and

ABR, Inc.—Environmental Research & Services

Study 10.7 Objectives

- Estimate the current **minimum population size** of Dall's sheep in the study area.
- Delineate the **summer range** of Dall's sheep in the study area.
- Evaluate the current condition of **mineral licks** in and near the Project area.
- Analyze and synthesize data from historical and current studies of Dall's sheep in the study area, as a continuation of AEA's 2012 study of big-game movement and habitat use.

Study 10.7 Components

- **Aerial Surveys** (ISR Part A, Section 4.1, pg 2)
- **Mineral Lick Surveys** (ISR Part A, Section 4.2, pg 2)
- **Analysis of Historical Data** (ISR Part A, Section 4.3, pg 3)

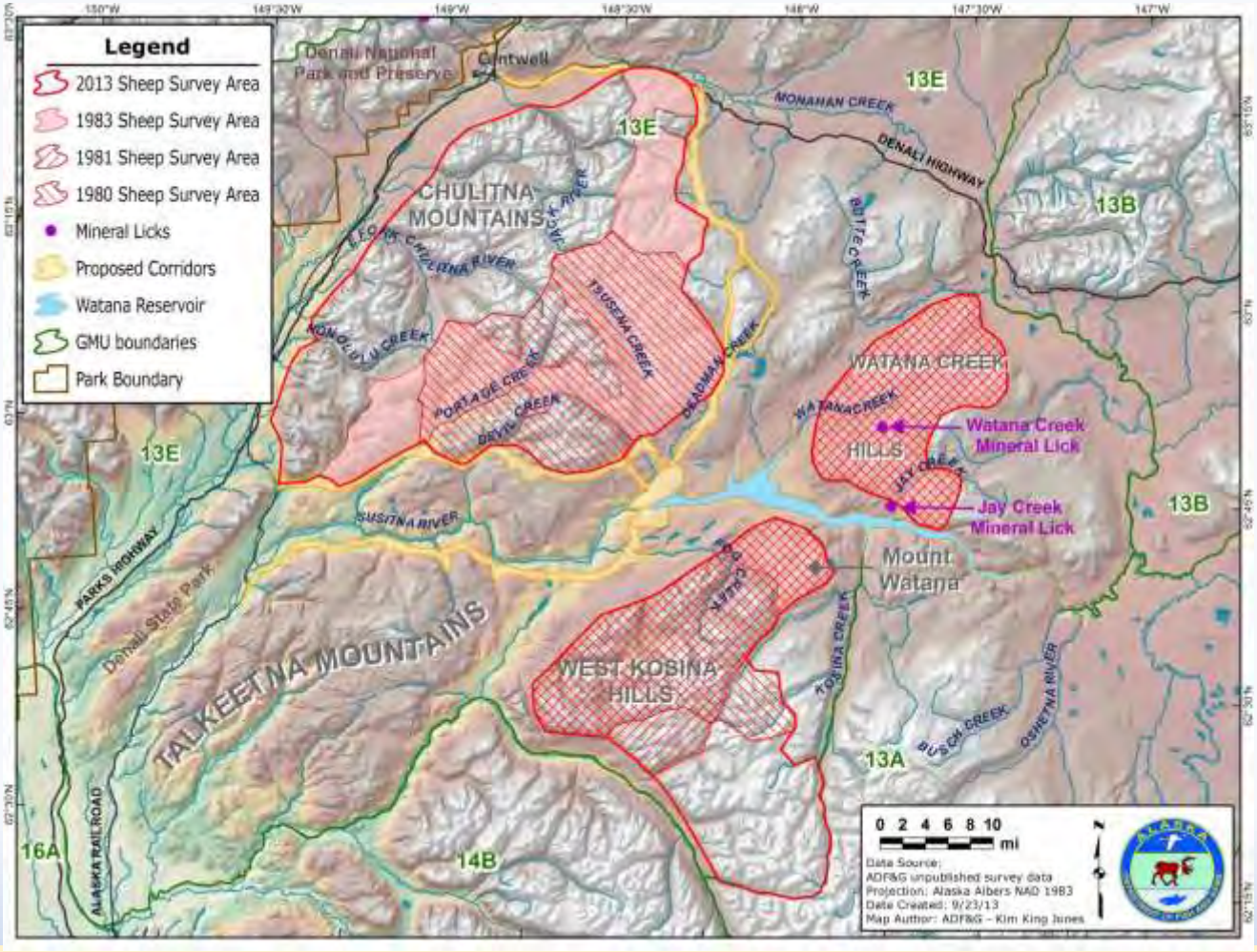
Study 10.7 Variances

- During the site visit to the Jay Creek mineral lick in late May 2013, the study team **deployed a time-lapse camera** to record sheep presence on the main cliff face of the mineral lick, thereby providing a greater volume of data on lick use than would have resulted from the two site visits proposed in RSP Section 10.7.4.

- The data obtained from time-lapse photography provided additional information to use in achieving the study objective regarding characterization of mineral lick use.

Study 10.7 Summary of Results in ISR (ISR Part A – Section 5)

Dall's Sheep Survey Areas: 1980s and 2013 (ISR Part A, Section 5.3, pg 4; Figure 4.1-1)

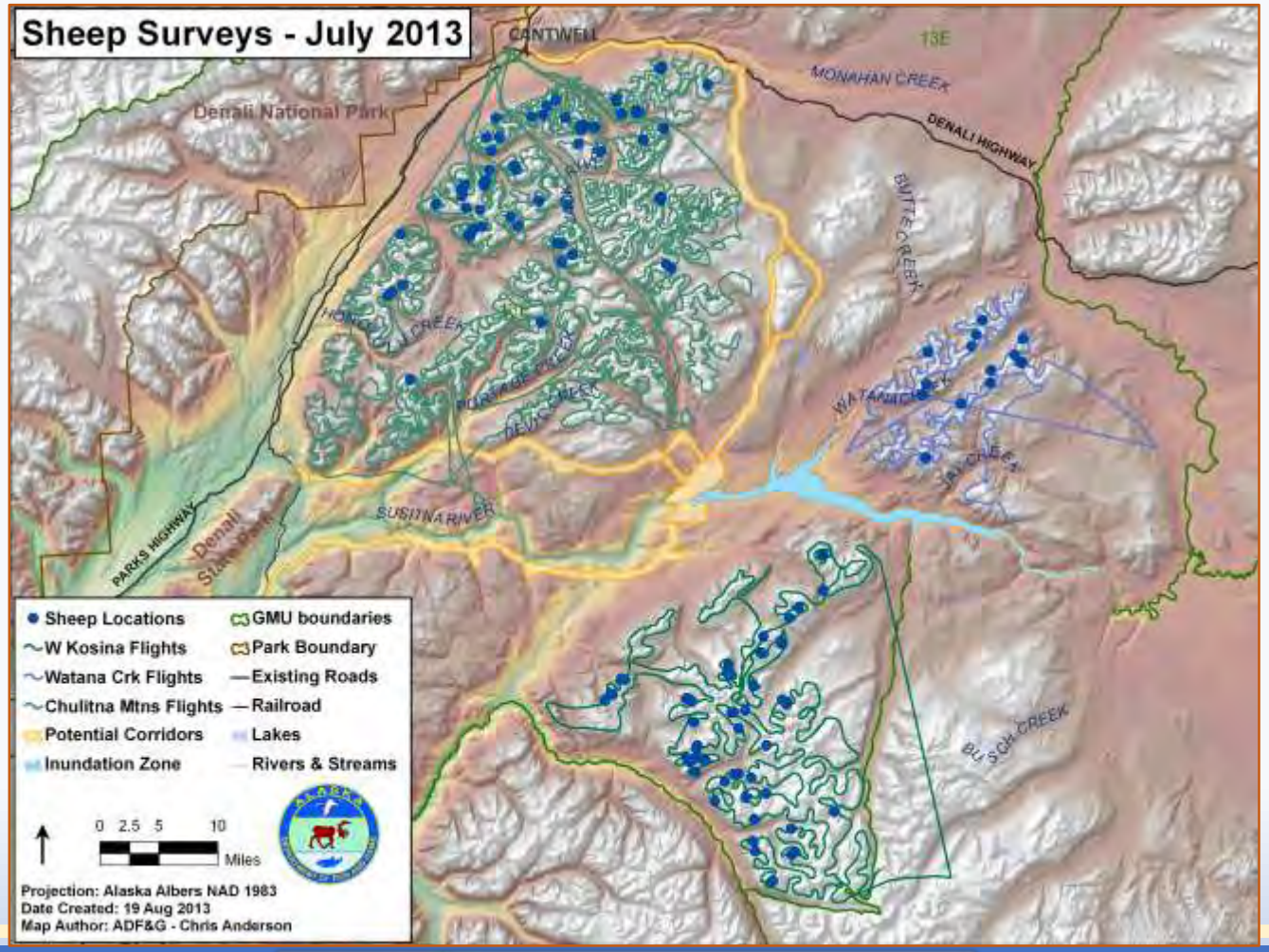


Study 10.7 Summary of Results in ISR (ISR Part A – Section 5)

- The Watana Creek Hills, West Kosina Hills, and Chulitna Mountains were surveyed by ADF&G in July 2013.
- A total of 512 sheep were observed during that survey (including 71 lambs), numbering 41 in the Watana Creek Hills, 194 in the West Kosina Hills, and 277 in the Chulitna Mountains.
- The Jay Creek and Watana Creek mineral licks were visited twice in 2013, on May 28–29 and June 19–20.
- Maximum counts were 7 sheep at the Jay Creek mineral lick and 3 sheep at the Watana Creek mineral lick during the two site visits in 2013.
- The Dall's sheep population in the Talkeetna Mountains declined sharply after the winter of 1999–2000 and have remained low, but stable, since then.

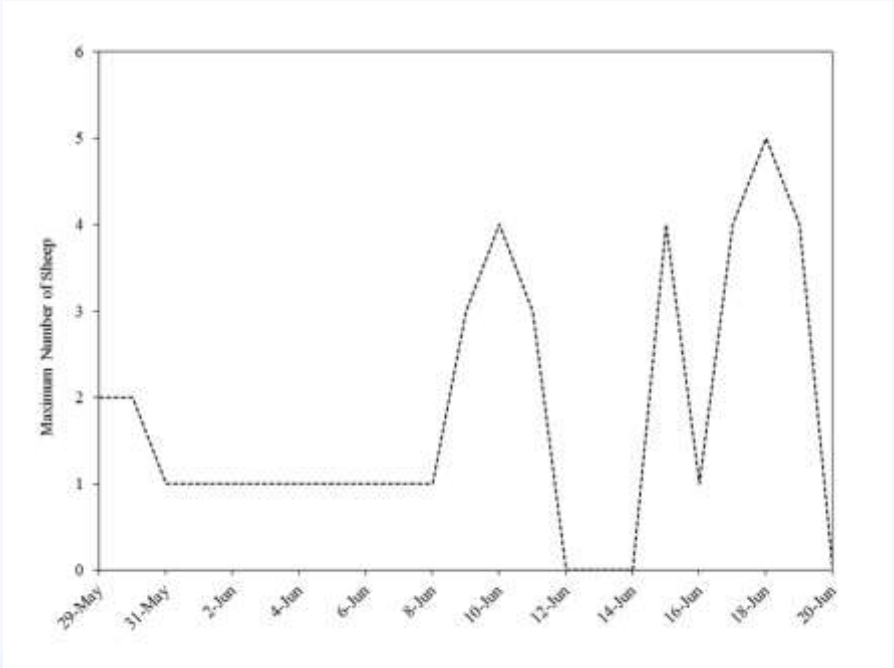
Study 10.7 Summary of Results in ISR (ISR Part A – Section 5)

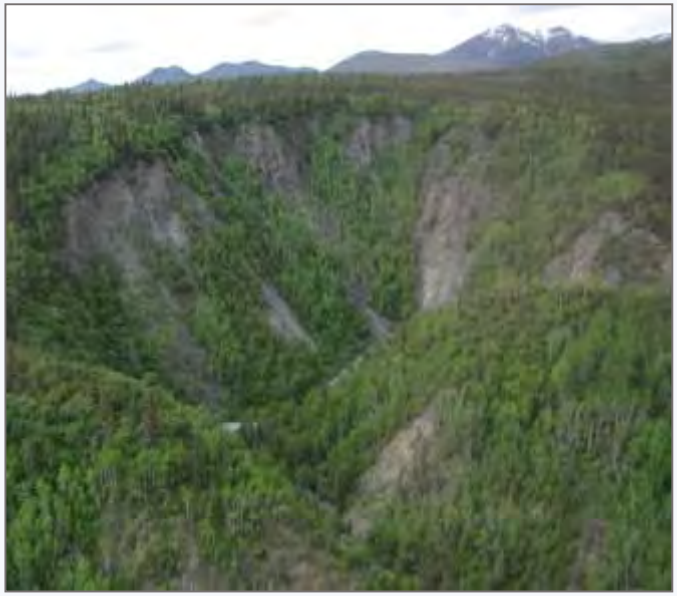
Dall's Sheep Locations on July 2013 Surveys (ISR Part A, Figure 5.1-1)



Study 10.7 Summary of Results in ISR (ISR Part A – Section 5)

Up to 5 Dall's sheep at a time were counted in time-lapse photos of the Jay Creek mineral lick during May 29–June 20, 2013.
(ISR Part A, Section 5.3, pg 4; Figure 5.2-1)





Study 10.7 Summary of Results since ISR

2014 Surveys:

- The Jay Creek and Watana Creek mineral licks were visited twice in 2014, on May 28–29 and June 18–19.
- On the May visit, 9 sheep were observed at the Watana Creek lick, whereas none were observed at the Jay Creek lick.
- On the June visit, no sheep were observed at either mineral lick.
- Based on time-lapse photos of the main cliff at the Jay Creek lick between May 29 and June 19, sheep were present at least between June 4 and June 11, with the maximum number visible at one time being 3 sheep.

AEA Proposed Modifications to Study 10.7 in ISR (ISR Part C – Section 7.1.2)

- No modifications to the Study Plan are needed to complete the study and meet the Study Plan objectives.

New Modifications to Study 10.7 since ISR

- The study team was unable to conduct aerial surveys of sheep in 2014 as planned, due to extensive, persistent snow throughout survey period; hence, ADF&G plans to conduct the second year of aerial surveys when conditions allow during June–early August 2015.

Current Status and Steps to Complete Study 10.7

- Mineral lick observations were completed in 2014.

- ADF&G plans to conduct the second year of aerial surveys when conditions allow in 2015 (during June–early August).

Steps to Complete Study 10.7 (ISR Part C – Section 7.1)

- AEA plans to finish this study in **2015** by completing the following methods, as described in RSP Section 10.7.4:
  - Complete the second year of aerial surveys for summer distribution and minimum population estimation (June–early August 2015).
  - Complete analysis of mineral lick visits.
  - Complete analysis of historical (1980s) data and synthesis with current ADF&G monitoring results.
  - Synthesize all information for presentation in USR.

Licensing Participants' Proposed Modifications to Study 10.7?

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 10.9 Wolverine Distribution, Abundance, and Habitat Occupancy

October 21, 2014

Prepared by

Alaska Department of Fish & Game

Study 10.9 Objectives

- **Estimate the current population size of wolverines.**
- **Establish a population index for wolverines.**
- **Describe the distribution of wolverines in late winter.**
- **Describe habitat use by wolverines in late winter.**

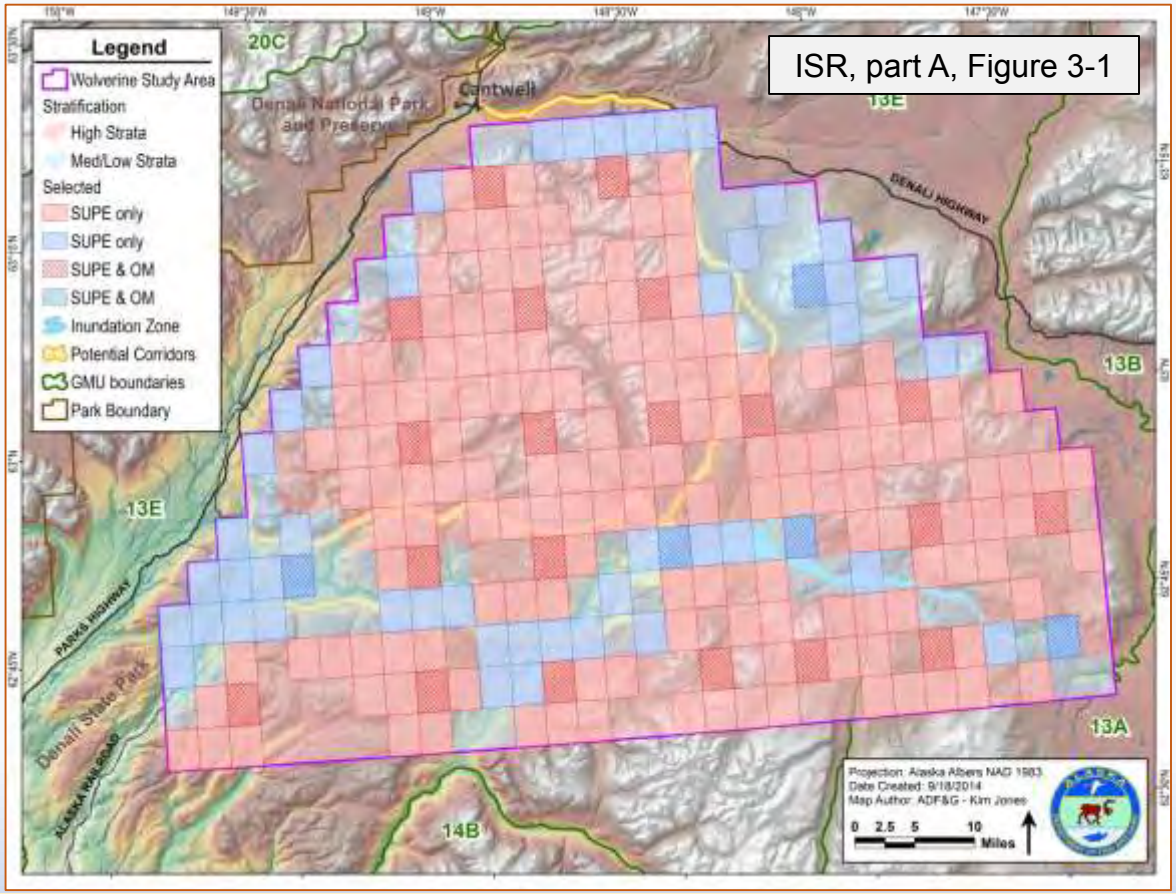
Study 10.9 Components

- **Sample-Unit Probability Estimator (SUPE) and Occupancy Surveys** (ISR Part A, Section 4.1, pp 2–3)

- **Occupancy Modeling** (ISR Part A, Section 4.2, pg 3)

Study 10.9 Summary of Results in ISR (ISR Part A – Section 5)

- Conducted 2 occupancy surveys in 2013 (ISR Part A, Section 5, pg 4).
- Detected wolverines or tracks in 23 of 25 sample units.



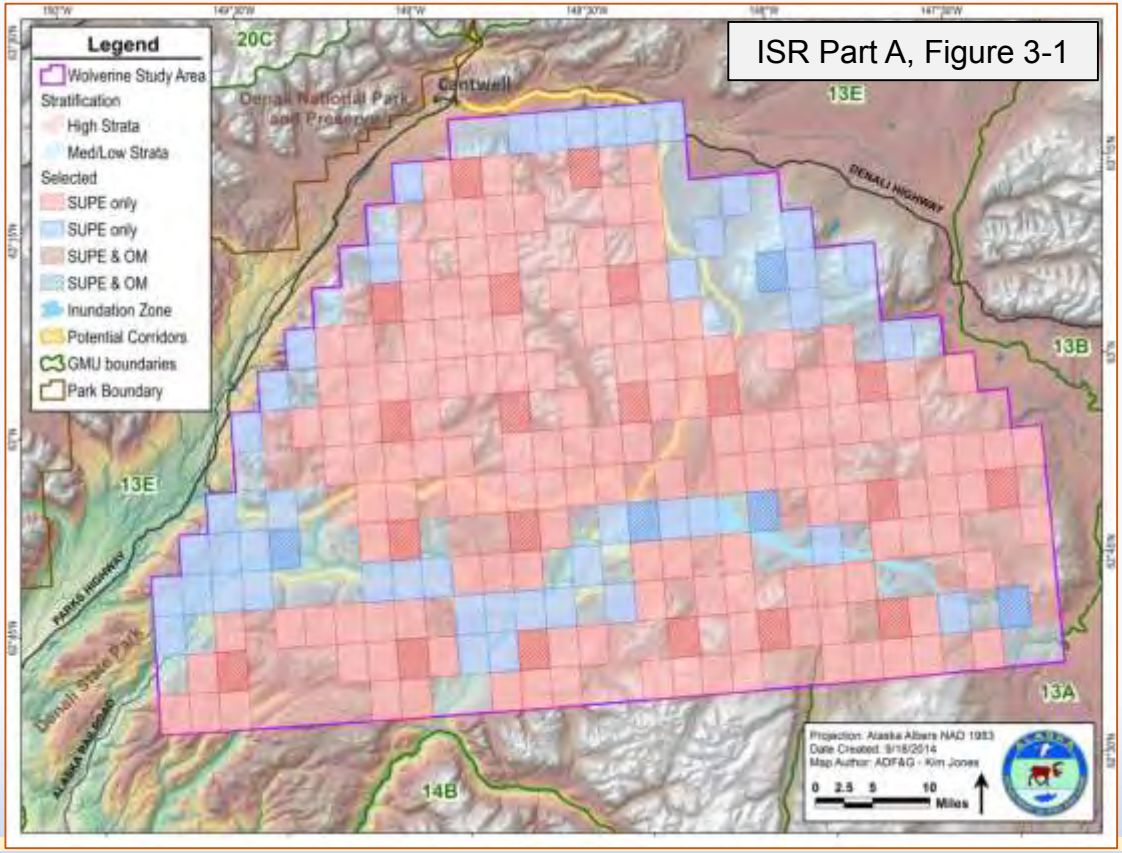
AEA Proposed Modifications to Study 10.9 in ISR (ISR Part C – Section 7.1.2)

Because snow conditions in 2014 did not allow for SUPE or occupancy surveys:

- Will attempt a SUPE survey in winter 2015.
- If snow conditions are not suitable for a SUPE survey in 2015, then will conduct an occupancy survey.

Steps to Complete Study 10.9 (ISR Part C – Section 7.1)

- Will attempt a SUPE survey in winter 2015 (RSP Section 10.9.4).
- If snow conditions are not suitable for a SUPE survey, then will complete an occupancy survey in 2015.



Licensing Participants' Proposed Modifications to Study 10.9?

- **Agencies**
- **CIRWG members and Ahtna**
- **Public**

Initial Study Report Meeting

Study 10.17
Population Ecology of Willow Ptarmigan in Game Management Unit 13

October 21, 2014

Prepared by

Alaska Department of Fish and Game

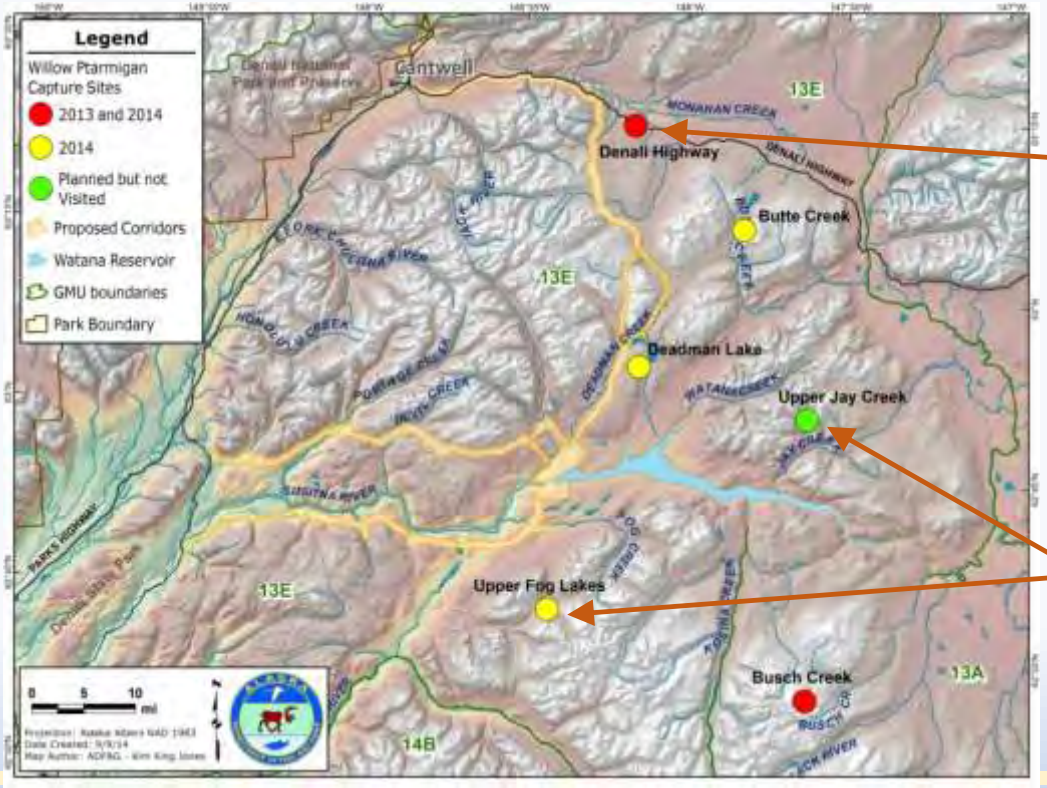
Study 10.17 Objectives

- Determine the seasonal distribution of Willow Ptarmigan in the Project area.
- Determine the seasonal migratory patterns of Willow Ptarmigan that occur in the Project area.
- Estimate the abundance of Willow Ptarmigan in the Project area during the breeding season and during the fall.
- Estimate seasonal survival of Willow Ptarmigan.

Study 10.17 Variances

Three variances resulted from the late spring, delayed snow melt, inclement weather, and subsequent transportation difficulties in 2013:

- Fewer radio tags were deployed than planned (RSP Section 10.17.4.1).
- Upper Fog Lakes and Jay Creek sites were not visited (RSP Section 10.17.3).
- Denali Highway capture location was added (ISR Part A, Section 4.1.1, pg 3).

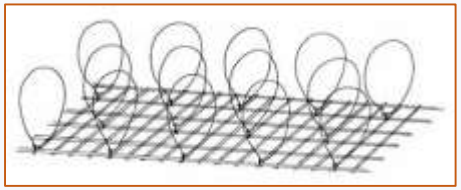


Study 10.17 Variances (continued)

Used mist nets to capture birds under some circumstances
(ISR Part A, Section 4.1.1, pp. 3–4)

Net Gun

Mist Net



Noose Carpets

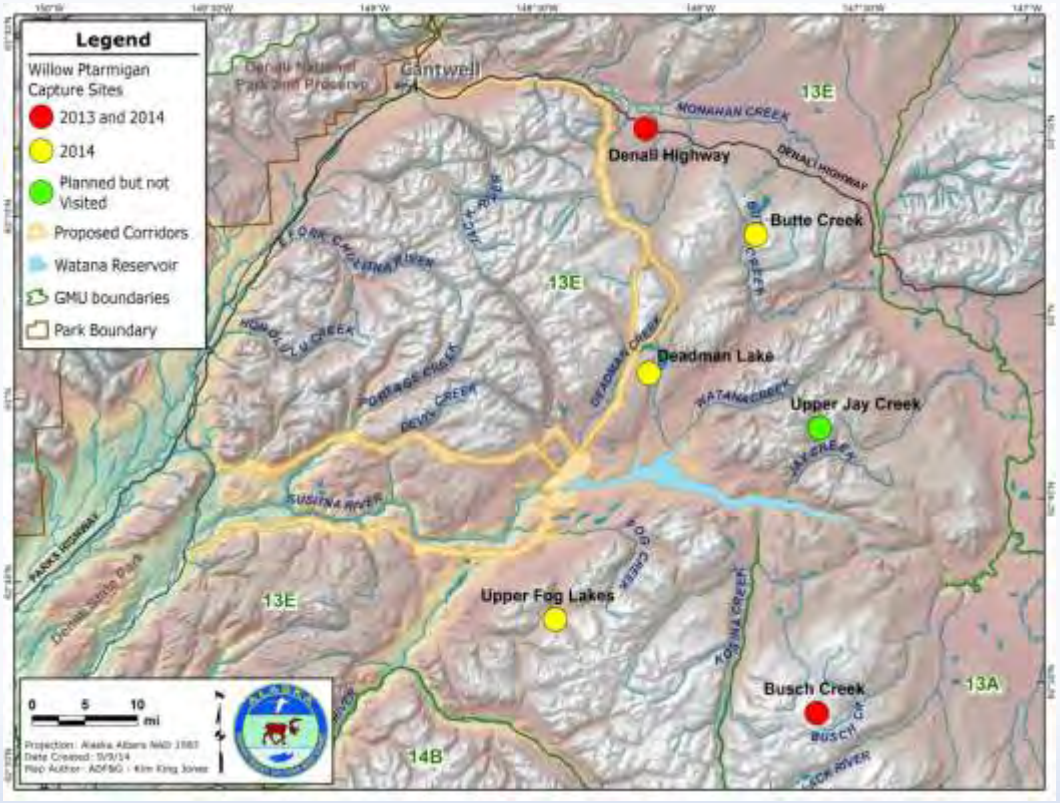
Study 10.17 Variances (continued)

Aerial transect flights were not conducted as proposed:

- Did not complete March 2013 transect flight.
- Moved September 2013 transect flight to mid-November/mid-December 2013 (ISR Part A, Section 4.3.1, pg 5).

Study 10.17 Summary of Results (ISR Part A – Section 5)

- Completed captures at two locations in 2013 and five locations in 2014.
- Sites in **red** visited in **2013 and 2014** and sites in **yellow** visited in **2014 only.**



Ptarmigan Captures 2013 and 2014					
Capture Location	May 2013	August 2013	May 2014	August 2014	Total
Busch Creek	12	10	19	12	53
Denali Highway	17	2	14	5	38
Butte Creek	-	-	6	1	7
Upper Fog Lakes	-	-	6	8	14
Deadman Lake	-	-	7	7	14
TOTAL	29	12	52	38	126

Study 10.17 Summary of Results in ISR (ISR Part C – Section 7.1.2, pg. 2)

- January 2014 transect flight resulted in 6 flushing events in 6 hours.
- March 2014 transect flight resulted in 4 flushing events in 4 hours.

AEA Proposed Modifications to Study 10.17 in ISR (ISR Part C – Section 7.1.2)

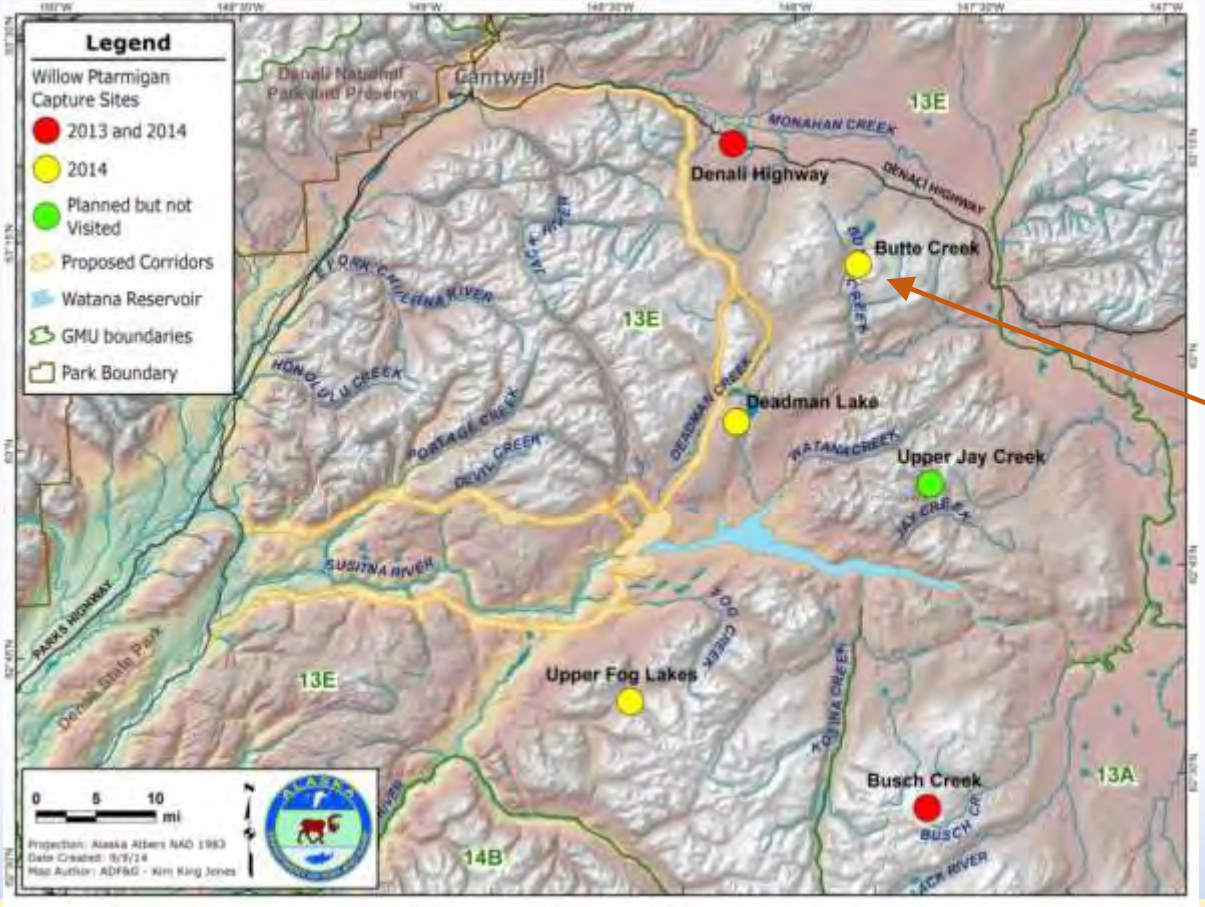
Aerial transect flights were canceled, but more telemetry flights were added:

- Improves the precision of space-use inferences.
- Allows better predictions about distribution of ptarmigan across the study area.

AEA Proposed Modifications to Study 10.17 in ISR (ISR Part C – Section 7.1.2)

Butte Creek capture site was added in 2014 as an alternative capture site

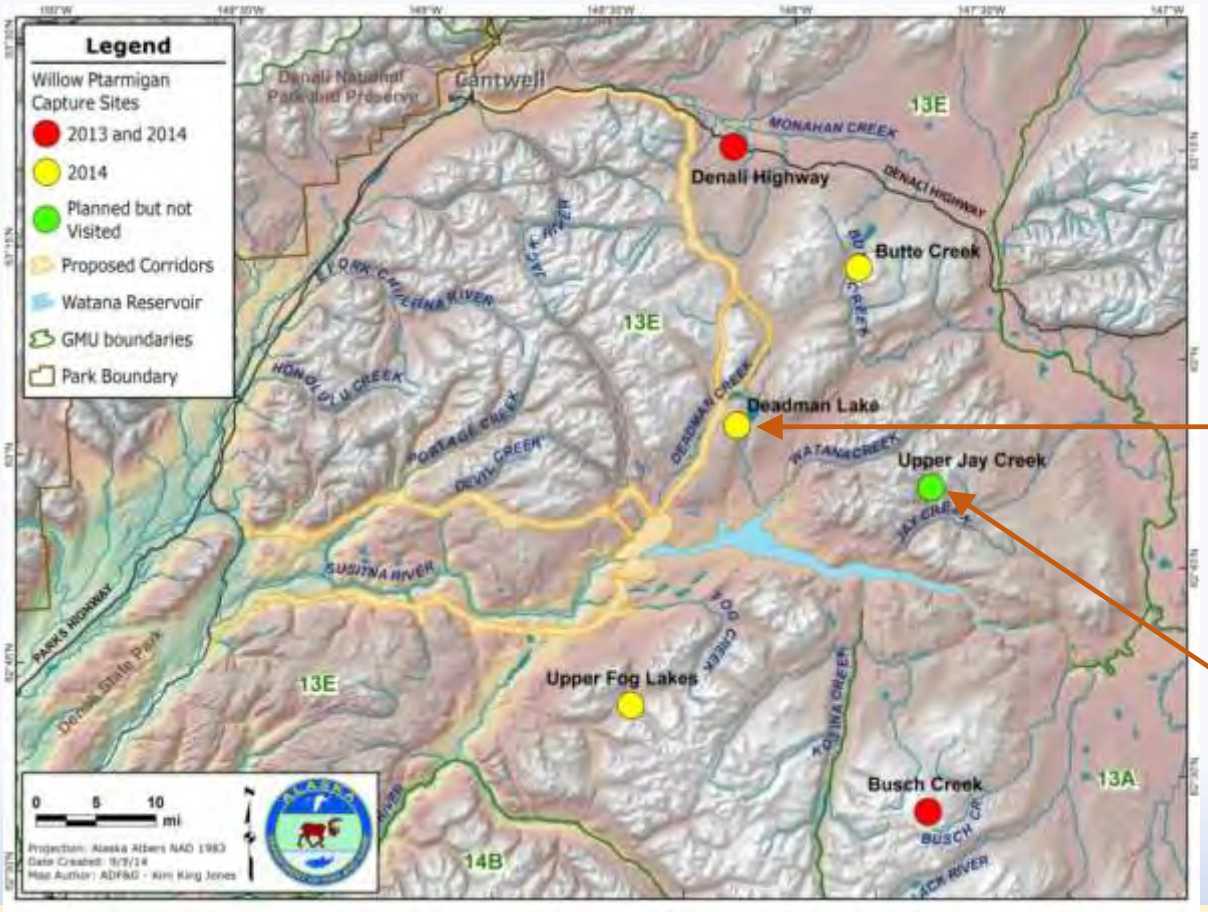
(ISR Part A, Figure 4.1-1 and ISR Part C, Section 7.1.2)



Added in 2014

New Modifications to Study 10.17 since ISR

- Deadman Lake site was added in 2014 as an alternative capture site.
- Upper Jay Creek site was not accessible.



New Modifications to Study 10.17 since ISR

ADF&G proposes the following modifications, which were accepted by AEA:

- Capture and collar additional birds in May and August 2015.
- Recapture and recollar currently collared birds in May and August 2015.
- This additional capture effort will allow us to reach the collaring objective of 50–100 collars/year (RSP Section 10.17.4.1).

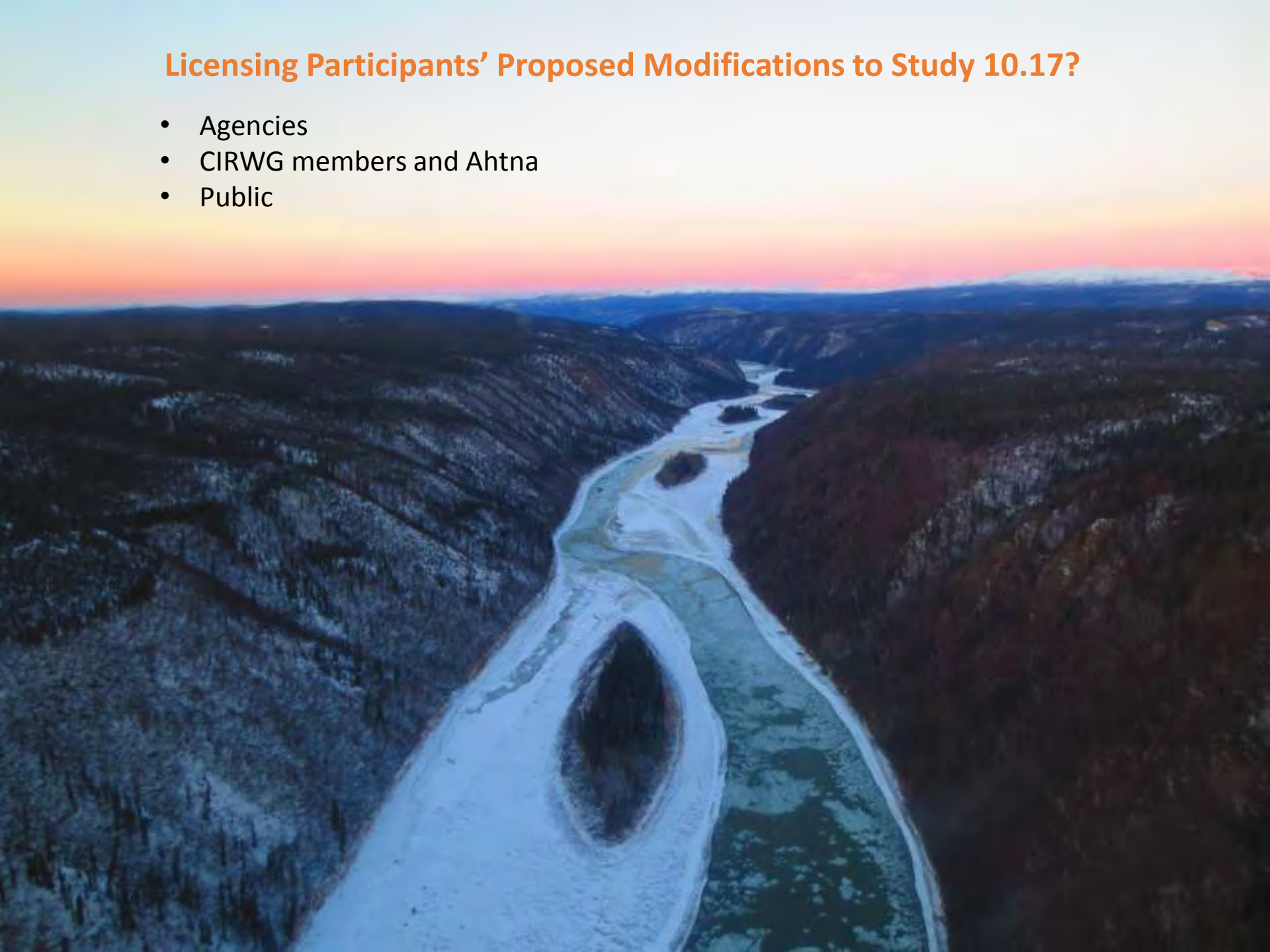
Ptarmigan Captures 2013 and 2014					
Capture Location	**May 2013**	**August 2013**	**May 2014**	**August 2014**	**Total**
Busch Creek	12	10	19	12	53
Denali Highway	17	2	14	5	38
Butte Creek	-	-	6	1	7
Upper Fog Lakes	-	-	6	8	14
Deadman Lake	-	-	7	7	14
TOTAL	**29**	**12**	**52**	**38**	**126**

Steps to Complete Study 10.17 (ISR Part C – Section 7.1)

- Conduct monthly aerial telemetry surveys to record habitat use, movements, and mortality.
- Capture and collar additional birds in May and August 2015.
- Recapture and recollar currently collared birds in May and August 2015.

Licensing Participants' Proposed Modifications to Study 10.17?

- Agencies
- CIRWG members and Ahtna
- Public



Initial Study Report Meeting

Study 10.10 Terrestrial Furbearer Abundance and Habitat Use

October 21, 2014

Prepared by

Institute of Arctic Biology,
University of Alaska Fairbanks

Study 10.10 Objectives

- Develop population estimates of coyotes, red foxes, lynx, and marten.
- Assess prey (snowshoe hare and vole) abundance in the study area.
- Compile habitat-use data for the furbearer species being studied.

Study 10.10 Components

- Sample Collection (ISR Part A, Section 4.1, pg 2):
  - Collect **scats** along transects following trails and streams during winter months (January through March) in 2013 and 2014.
  - Collect **hair samples** from lynx and marten using hair-snag devices in both years and, in 2014, at natural rub sites.
- Genetic Analysis (ISR Part A, Section 4.2, pg 4):
  - Perform **fecal genotyping** to identify each collected sample to the species and individual level.
- Habitat Use (ISR Part A, Section 4.3, pg 5):
  - Conduct **aerial track surveys** in winter.
- Statistical Analyses and Data Interpretation

  (ISR Part A, Section 4.4, pg 6):
  - Use **genetic fingerprints as a genetic mark for a capture–mark–recapture population estimate**.
  - **Model species occupancy and detection probabilities**.

Study 10.10 Variances

- Lack of access to Cook Inlet Regional Working Group (CIRWG) lands in 2013 prevented **marten surveys** from being conducted as planned (RSP Section 10.10.4.1).
- No surveys were conducted in the **Chulitna and Gold Creek corridors** in 2013 due to limitations on access.
- To maximize sampling effort in areas accessible by snowmachine from the 2013 winter base of operations on the Denali Highway, the study team expanded the **2013 survey area** to include areas northeast of the study area.
- Deployment and use of **lynx hair snags** (RSP Section 10.10.4.1) was modified to increase sampling efficiency in the field and to create a survey layout that allowed better comparison of the lynx survey data with those from the canid scat collection effort.
- **Snowshoe hare sampling** grid distribution (RSP Section 10.10.4.1) was altered to better account for variability of habitats throughout the 2013 survey area.
- The **vole live-trapping surveys** were shortened from the 1–5 nights originally proposed to a single night per grid.

Study 10.10 Summary of Results in ISR (ISR Part A – Section 5)

Sample Collection in Winter 2013 for Genetic Analyses:

- Scat collections were successful in 2013, whereas hair collection had variable success.

ISR Table 5.1-1 (table number corrected per ISR Part B)

Species	Number of Scat Samples Collected
Coyote	35
Red Fox	76
Lynx	2
Marten	6
Wolverine	12
Total	**131**

ISR Table 5.1-2 (table number corrected per ISR Part B)

Species	Number of Hair Samples Collected
Lynx	23
Wolverine	6
Total	**29**

Study 10.10 Summary of Results in ISR (ISR Part A – Section 5)

Prey Surveys in Summer 2013:

- Prey numbers were highly variable across the study area, but appeared to be at relatively low densities overall.

ISR Table 5.1-3 (table number corrected per ISR Part B)

Survey Location	Average Number of Snowshoe Hare Pellets / Plot
1) Watana Creek Shrub	2.04
2) Jay Creek Forest	2.24
3) Tsusena Creek Shrub	8.7
4) Deadman Creek Forest	25.84
5) Watana Creek Forest	3.34
6) Upper Butte Creek Forest	0.48
7) Upper Butte Creek Shrub	1.32
8) Seattle Creek Shrub	3.78
9) Seattle Creek Forest	0.33
10) Butte Lake Forest	0.62
11) Butte Lake Shrub	16.48
12) Southern Butte Creek Forest	6.16
13) Southern Butte Creek Shrub	3.28
14) Jay Creek Shrub	45.16
15) Oshetna Creek Forest	29.78
Range	0.33 – 45.16

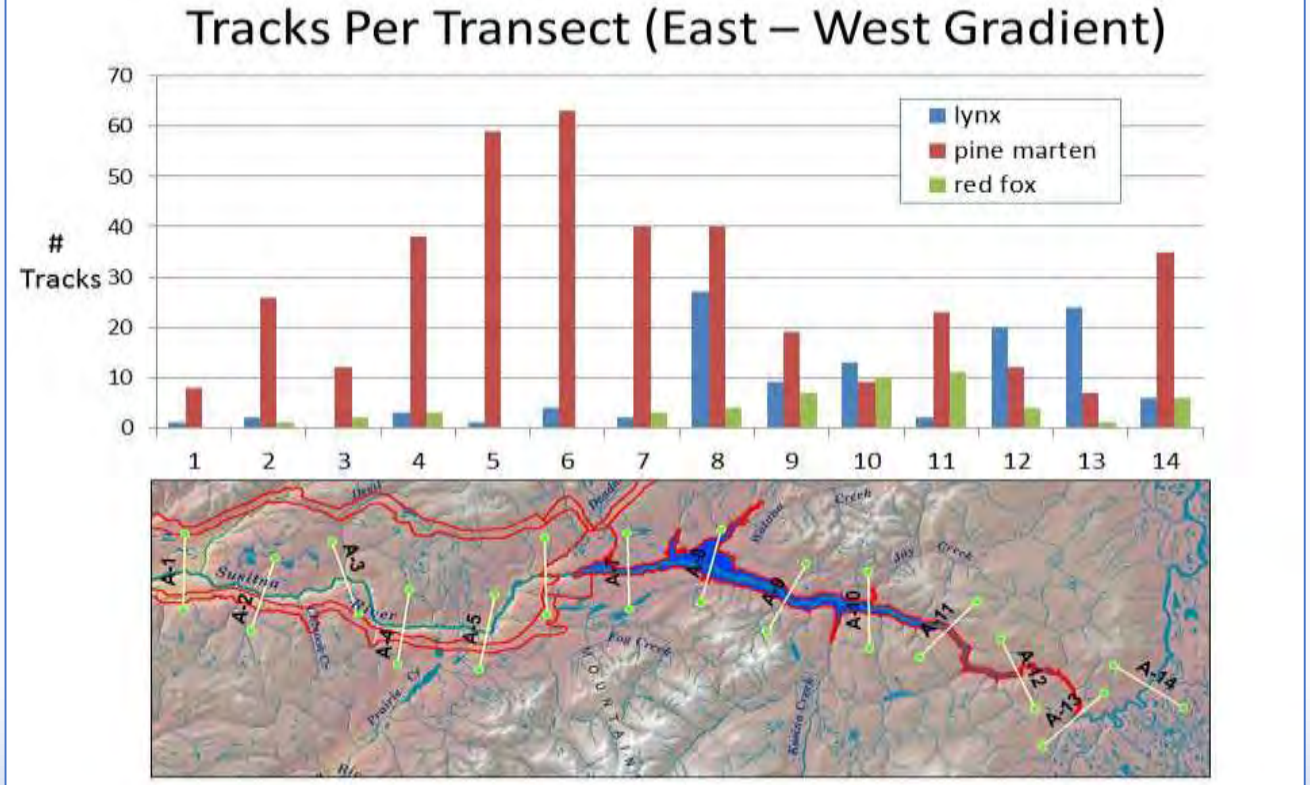
ISR Table 5.1-4 (table number corrected per ISR Part B)

Survey Location	Number of Captured Voles (Species)
1) Watana Creek Forest	1 (Red-backed Vole)
2) Watana Creek Meadow	0
3) Jay Creek Forest	0
4) Jay Creek Meadow	2 (Meadow Vole, Singing Vole)
5) Tsusena Creek Forest	1 (Red-backed Vole)
6) Tsusena Creek Meadow	0
7) West Tsusena Creek Forest	2 (Red-backed Vole)
8) West Tsusena Creek Meadow	1 (Red-backed Vole)
9) Upper Butte Creek Forest	1 (Red-backed Vole)
10) Upper Butte Creek Meadow	1 (Red-backed Vole)
11) Upper Watana Creek Forest	1 (Red-backed Vole)
12) Upper Watana Creek Meadow	0
13) Seattle Creek Forest	1 (Red-backed Vole)
14) Seattle Creek Meadow	2 (Red-backed Vole)
15) Deadman Mountain Meadow	0
Total	13

Study 10.10 Summary of Results in ISR (ISR Part A – Section 5)

Aerial Track Surveys in Winter 2013:

- Three surveys were conducted (February 26, March 27, April 19) along the same 14 transects surveyed for the APA Project in November 1980.



(Counts were summed across the three surveys.)

ISR Part A, Figure 5.2-1

Study 10.10 Summary of Results since ISR

Sample Collection in Winter 2014 for Genetic Analyses:

- Success of coyote and red fox scat collection increased from 2013.
- Lynx hair collection was improved from 2013 by adding backtracking and collection at natural rub sites.
- Marten hair collection was again hindered by lack of access to CIRWG lands.

Species	Number of Scat Samples Collected	Number of Hair Samples Collected
Coyote	99	0
Red Fox	101	0
Lynx	14	46
Marten	4	20
Unknown canid	6	0
Total	**224**	**66**

Study 10.10 Summary of Results since ISR

Prey Surveys in Summer 2014:

- Prey surveys were conducted during July. Raw data suggests variable hare distribution and a significant increase in vole abundance from 2013.

2013 Vole Captures, by Survey Site

Survey Location	Number of Captured Voles (Species)
1) Watana Creek Forest	1 (Red-backed Vole)
2) Watana Creek Meadow	0
3) Jay Creek Forest	0
4) Jay Creek Meadow	2 (Meadow Vole, Singing Vole)
5) Tsusena Creek Forest	1 (Red-backed Vole)
6) Tsusena Creek Meadow	0
7) West Tsusena Creek Forest	2 (Red-backed Vole)
8) West Tsusena Creek Meadow	1 (Red-backed Vole)
9) Upper Butte Creek Forest	1 (Red-backed Vole)
10) Upper Butte Creek Meadow	1 (Red-backed Vole)
11) Upper Watana Creek Forest	1 (Red-backed Vole)
12) Upper Watana Creek Meadow	0
13) Seattle Creek Forest	1 (Red-backed Vole)
14) Seattle Creek Meadow	2 (Red-backed Vole)
15) Deadman Mountain Meadow	0
Total	13

2014 Vole Captures, by Survey Site

Survey Location	Number of Captured Voles (Species)
1) Watana Creek Forest	3 (Red-backed Vole)
2) Watana Creek Meadow	10 (Red-backed Vole)
3) Jay Creek Forest	9 (Red-backed Vole)
4) Jay Creek Meadow	14 (Meadow Vole, Red-backed Vole)
5) Tsusena Creek Forest	9 (Red-backed Vole, Meadow Vole)
6) Tsusena Creek Meadow	11 (Red-backed Vole)
7) West Tsusena Creek Forest	NA – grid flooded
8) West Tsusena Creek Meadow	NA – grid flooded
9) Upper Butte Creek Forest	7 (Red-backed Vole)
10) Upper Butte Creek Meadow	2 (Red-backed Vole)
11) Upper Watana Creek Forest	4 (Red-backed Vole)
12) Upper Watana Creek Meadow	7 (Singing Vole)
13) Seattle Creek Forest	9 (Red-backed Vole)
14) Seattle Creek Meadow	2 (Red-backed Vole)
15) Deadman Mountain Meadow	0
Total	87

Study 10.10 Summary of Results since ISR

Aerial Track Surveys in Winter 2014:

- Due to poor snow conditions, only two aerial track surveys were conducted in winter 2014 (February 17 and March 25).
- A total of 458 furbearer tracks were detected, including 179 marten, 61 red fox, 47 lynx, and 21 coyote tracks.
- Coyote tracks were detected in 2014 but not 2013; increased coyote activity was likely due to reduced snow cover in 2014.
- Tracks of non-target species included 55 wolverine, 37 wolf, 33 weasel, 5 river otter, and 1 bear.

Genetic and Statistical Analyses in 2014:

- Fecal genotyping has been completed for all 2013 samples.
- Fecal genotyping is approximately 50% complete for 2014 samples.
- Preliminary population estimates for coyotes and red fox based on 2013 scat data have been completed.
- Occupancy modeling for 2014 furbearer track data is underway.

AEA Proposed Modifications to Study 10.10 in ISR (ISR Part C – Section 7.1.2)

- Addition of Denali East Option road and transmission corridor.
- The variances described in ISR Part A, Section 4.1.1, were continued, except for the use of motion-sensing cameras for occupancy modeling.
- Inclusion of marten survey as originally outlined.
  - Restricted to forested areas on accessible lands near proposed reservoir inundation zone (no access to CIRWG lands during winter sampling).
- A change in base camp location allowed a slight expansion of the accessible study area.
- Results from surveys on accessible land areas will be extrapolated across entire study area, based on habitat classifications.

New Modifications to Study 10.10 since ISR

- The Chulitna Corridor has been dropped from the study area.
- To increase hair sample size for lynx, fresh lynx tracks were backtracked through dense cover to collect hair from natural rub sites along trails.
- Incidental data on wolverine and wolf activity were recorded during the winter study season.

Example of lynx hair sample collected on backtracking survey.

Steps to Complete Study 10.10 (ISR Part C – Section 7.1)

- All data collection was completed during the winter (January–April) and summer (July) field seasons in 2014.
- Genetic analysis on scat and hair samples is underway in the Prugh Lab at UAF, scheduled for completion by January 2015.
  - DNA extractions are complete; amplification and individual fingerprinting analyses are underway.
- Spatially explicit furbearer population estimates will be generated upon completion of genetic analyses.
- Furbearer occupancy modeling is underway and will be completed by spring 2015.

Licensing Participants' Proposed Modifications to Study 10.10?

Coyote and fox photos taken at caribou carcass in upper Watana Creek.

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 10.13
Bat Distribution and Habitat Use

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 10.13 Objectives

- Assess the occurrence of bats and the distribution of habitats used by bats within the proposed reservoir inundation zone and associated infrastructure areas for the Project

- Review geological and topographical data to assess the potential for roosting, maternity, and hibernacula sites in the study area

- Examine suitable geological features (caves, crevices) and human-made structures (buildings, mines, bridges) for potential use by bats as roosting sites, maternity colonies, and hibernacula

Study 10.13 Components

- Acoustic Surveys

(ISR Part A, Section 4.1; pg 2)

- Roost Surveys

(ISR Part A, Section 4.2; pg 3)

- Data Management/Analysis

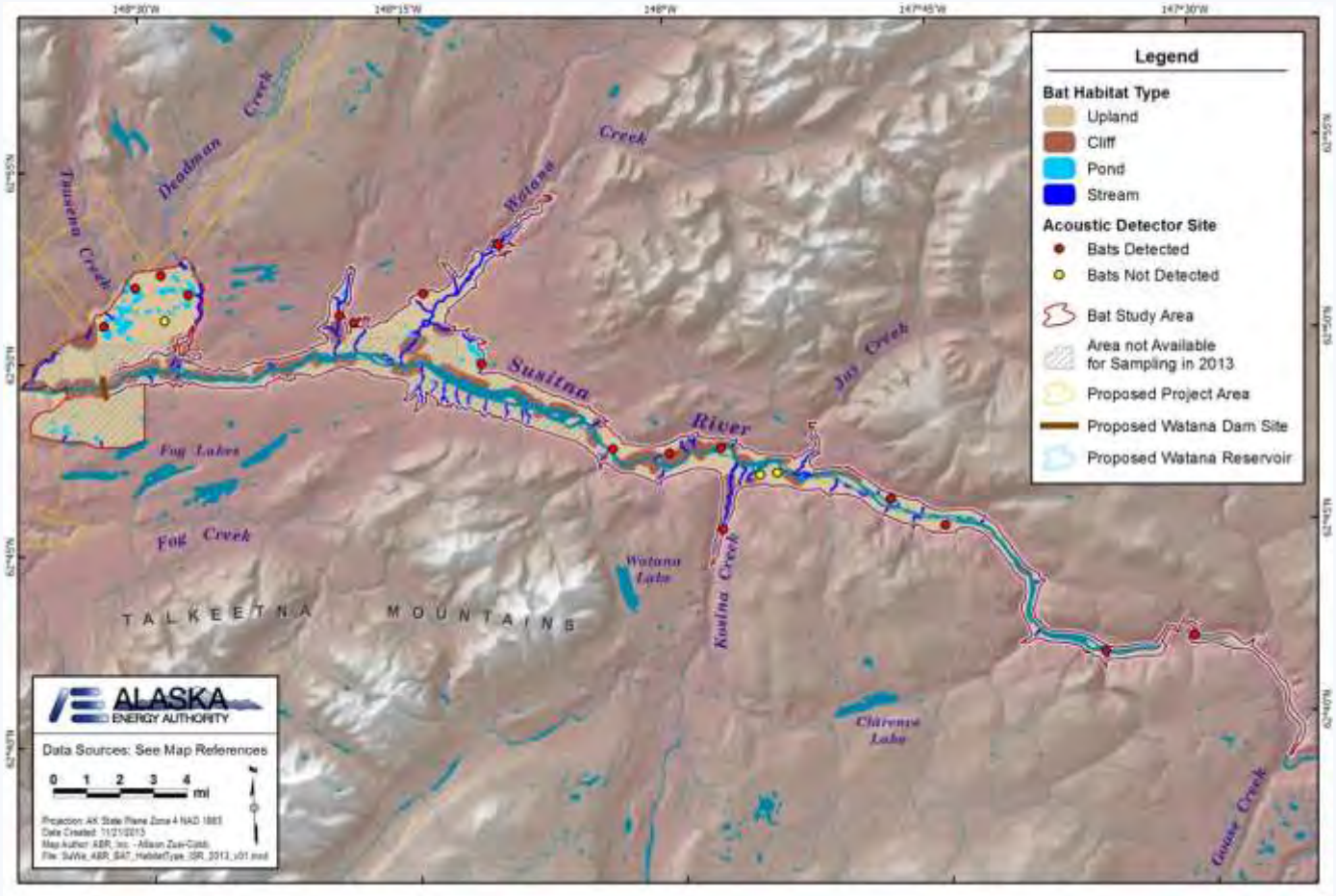
(ISR Part A, Section 4.3; pg 5)

Study 10.13 Variances

- Acoustic monitoring and ground-based roost searches could not be conducted as planned on Cook Inlet Regional Working Group (CIRWG) lands in 2013 due to lack of access agreement (RSP Section 10.13.4.1).

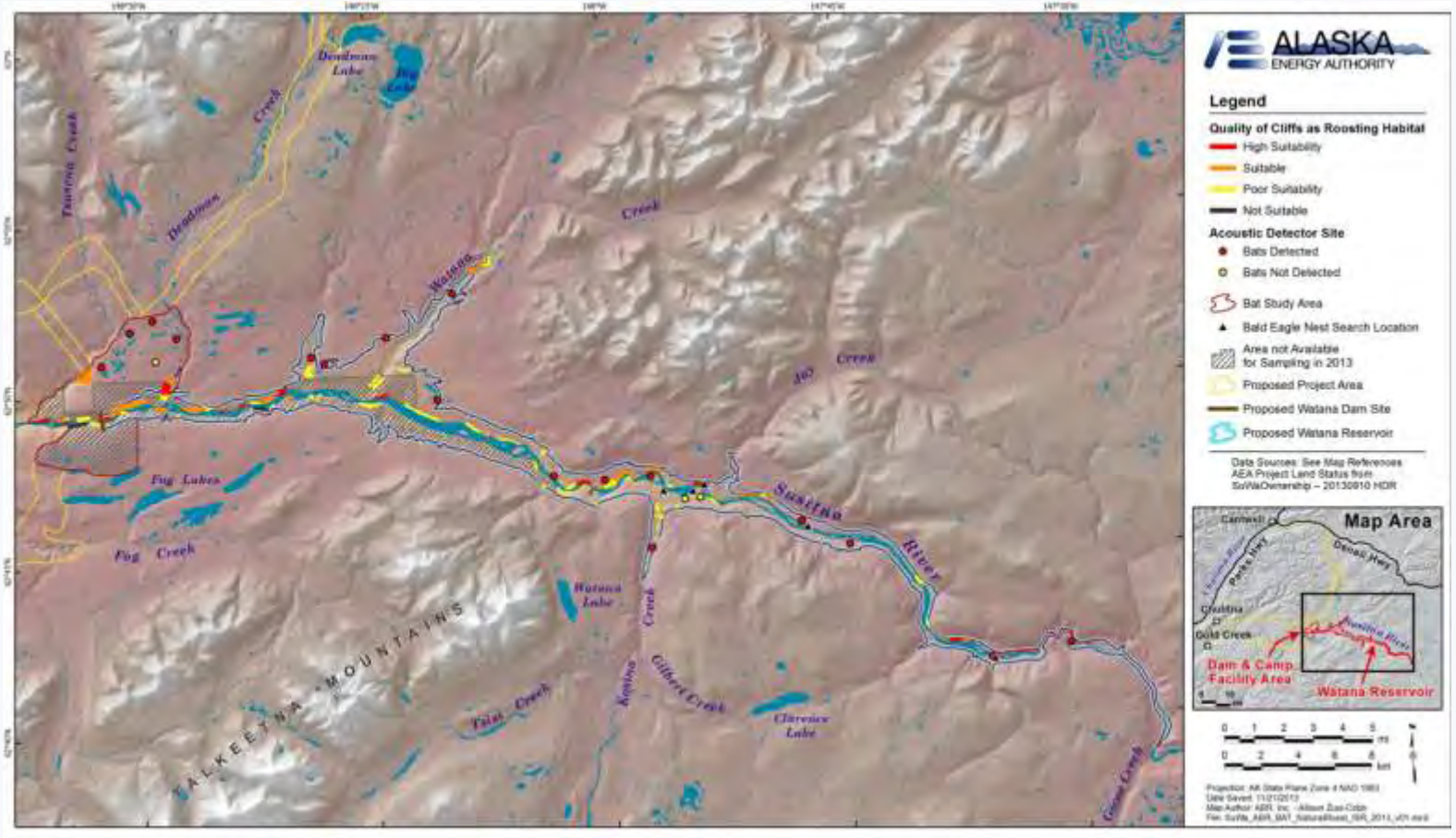
- Search effort for artificial roosts (RSP Section 10.13.4.1) was expanded to include additional nearby structures outside of the study area.

Study 10.13 Summary of Results in ISR (ISR 10.13, Part A – Section 5)



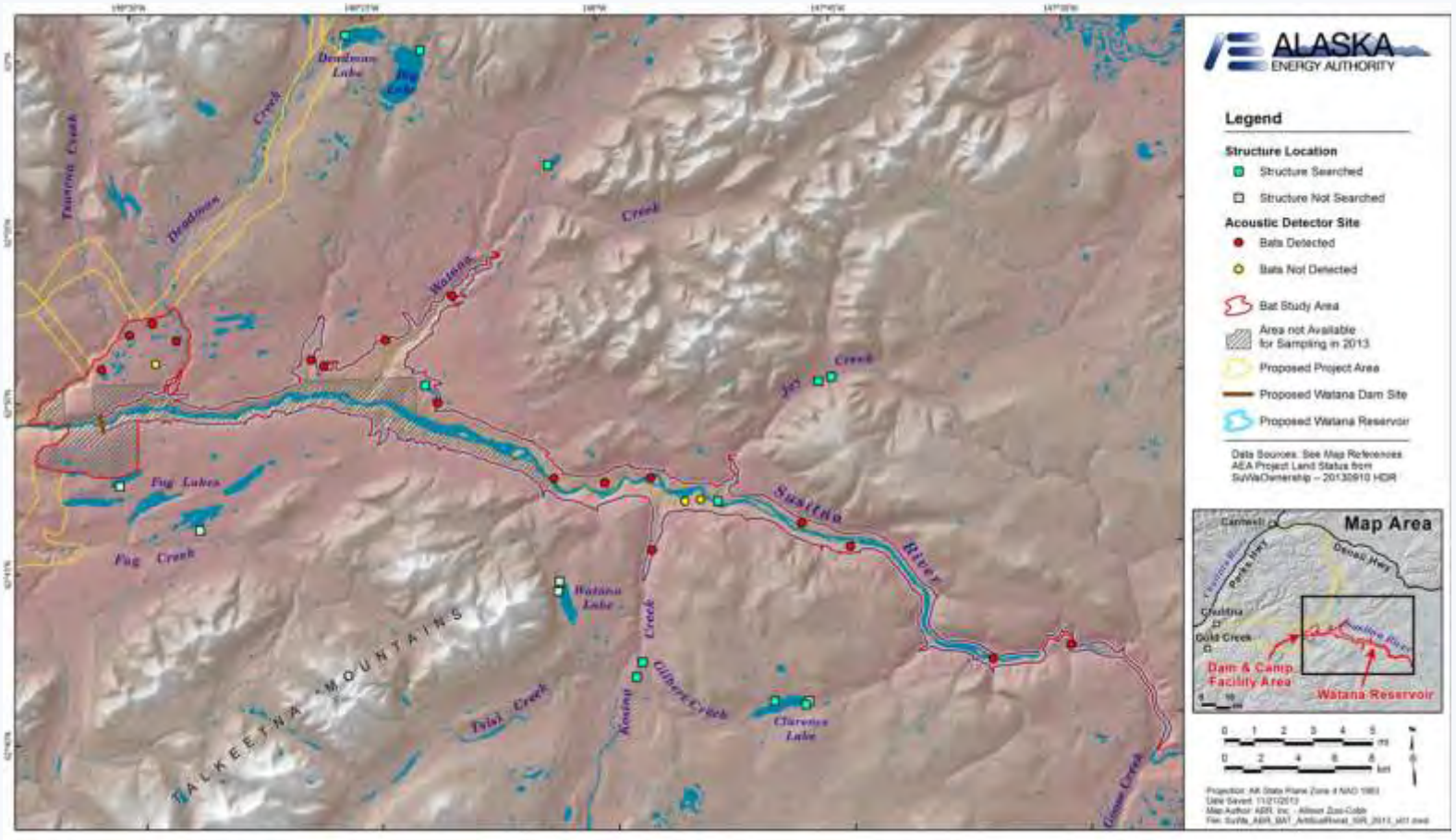
Widespread occurrence of bats was documented throughout the study area, based on calls recorded at 17 (85%) of 20 acoustic monitoring sites.

Study 10.13 Summary of Results in ISR (ISR 10.13, Part A – Section 5)



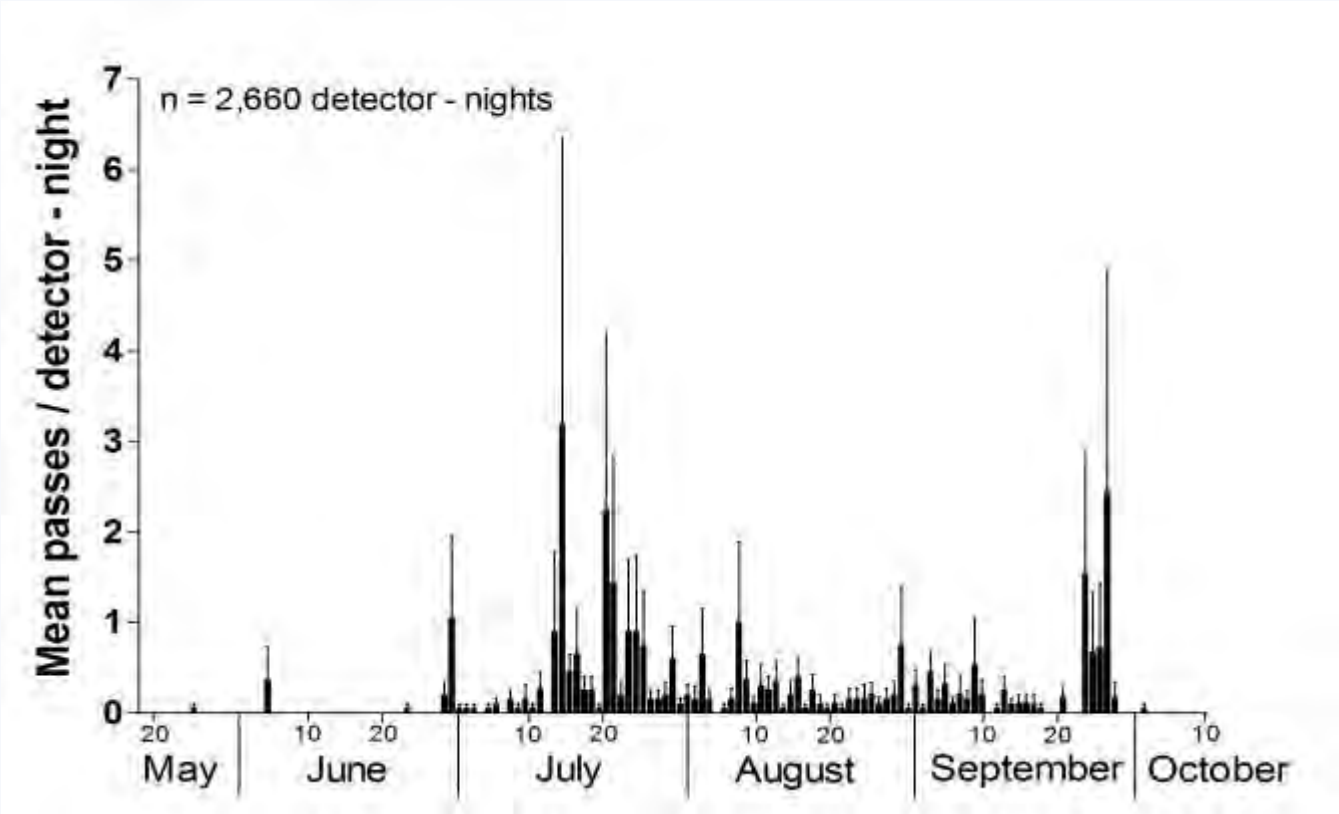
Study team assessed extensive cliff systems along Susitna River and tributaries as potential natural roosts, and also examined Bald Eagle nest trees.

Study 10.13 Summary of Results in ISR (ISR 10.13, Part A – Section 5)



Study team searched 11 potential artificial roost sites in and near study area, including 26 separate structures, but did not locate any bats or evidence of roosting.

Study 10.13 Summary of Results in ISR (ISR 10.13, Part A – Section 5)



Seasonal activity peaked in July (when maternity colonies are active) and in late September (prehibernation/migration period) in 2013.

AEA Proposed Modifications to Study 10.13 in ISR (ISR 10.13, Part C – Section 7.1.2)

- The study team will conduct acoustic monitoring in 2014 by using 6 detectors deployed at sites with the highest rates of detection in 2013 and by deploying 4 detectors on CIRWG lands, which were not sampled in 2013.

- The study team will attempt to deploy 6 radio transmitters each during 2 separate capture/tagging/tracking stints (totaling 12 transmitters) in July and September 2014, to locate roosting sites of bats in the study area.

Study 10.13 Summary of Results since ISR

Decision Point (ISR 10.13, Part C, Section 7.1.1):

- Continuation of surveys in 2014 was predicated on locating roost sites in 2013. No roosts were found that year, but peaks of seasonal activity were found during the maternity colony and prehibernation/migration periods, so surveys were continued.

2014 work:

- Continuation of acoustic monitoring at 6 sites on ADNR and BLM lands that were monitored in 2013, and at 4 new sites on CIRWG lands
- First bat capture/tagging/radio-tracking effort, conducted July 14–28:
  - Poor weather (wet, cool) reduced capture success.
  - Captured and tagged 1 little brown bat (*Myotis lucifugus*).
  - Tracked bat to 3 sections of cliff over a 10-day period.
- Second bat capture/tagging/radio-tracking effort, conducted Sep 18–Oct 1:
  - Cold, clear nights with average lows around 20° F.
  - Bats were active at temperatures down to 30° F.
  - Capture attempts were unsuccessful.

Current Status – Study 10.13

Acoustic Monitoring:

- Collected acoustic data in 2013 and 2014 to assess the occurrence of bats and the distribution of habitats used by bats in the study area.

Roost Sites:

- In 2013, study team conducted initial assessments of potential roosting structures, including ground-based searches of natural sites (cliffs, trees) and artificial structures (cabins).
- In 2014, study team used radio telemetry to locate and collect additional information on bat roosts in the study area.

Steps to Complete Study 10.13 (ISR 10.13, Part C – Section 7.1)

AEA completed all field data collection for this study in 2014.

Work remaining:

- Complete analysis of 2014 acoustic data, with no modifications from ISR.
- Complete the data analysis of roosting information from 2014 telemetry effort, with no modifications from ISR.
- Synthesize all information for inclusion in USR.

Licensing Participants' Proposed Modifications to Study 10.13?

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 10.11
Aquatic Furbearer Abundance and Habitat Use

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 10.11 Objectives

- Delineate the distribution and estimate the current population size of beavers.
- Describe the distribution and relative abundance of river otters, mink, and muskrats.
- Describe habitat associations of aquatic furbearers.
- Review available information on food habits and diets of piscivorous furbearers (river otter and mink) as background for the pathways analysis for Study 5.7 (Mercury Assessment and Potential for Bioaccumulation).
- Collect hair samples from river otters and mink to characterize baseline tissue levels of mercury for Study 5.7 (Mercury Assessment and Potential for Bioaccumulation).

Study 10.11 Components

- Beaver and Muskrat Surveys (ISR Part A, Section 4.1, pg 2)
  - Aerial surveys of beaver colonies in fall and spring
  - Aerial survey of muskrat “pushups” in spring

- River Otter and Mink Surveys (ISR Part A, Section 4.2, pg 3)
  - Aerial surveys of tracks in winter

- Information for Mercury Assessment (ISR Part A, Section 4.3, pg 4)
  - Literature review of food habits and diets of river otter and mink
  - Hair sampling of river otter and mink for mercury analysis

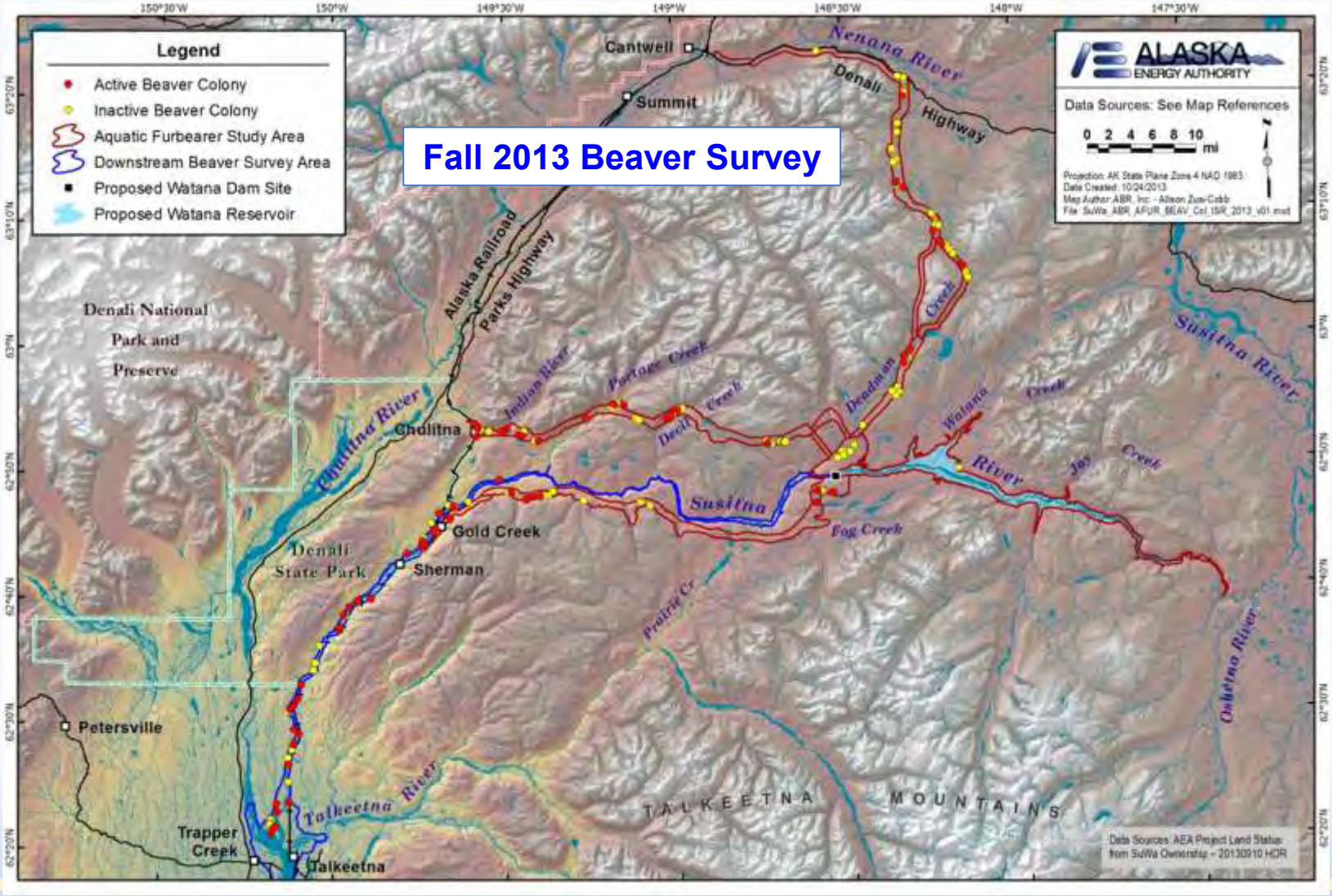
Study 10.11 Variances

- **Aerial surveys for beaver were broadened** to include areas outside the study area (see RSP Sections 10.11.3 and 10.11.4.1), to cover the entire riverine physiography area delineated for Study 11.6 (Riparian Vegetation Study Downstream of the Proposed Susitna–Watana Dam), which provided more data than would have been collected otherwise.
- The planned **survey of muskrat pushups (RSP Section 10.11.4.1) was not conducted in 2013** because of the unusually late spring and persistent snow and ice cover; instead, researchers conducting surveys for Study 10.15 (Waterbird Migration, Breeding, and Habitat Use) and Study 10.14 (Surveys of Eagles and Other Raptors) in May 2013 recorded the presence of muskrat pushups.
- **Track surveys for river otters and mink were not conducted** in February–early April 2013 (RSP Section 10.11.4.1) or in November/December 2013 due to the lack of a suitable weather window in relation to pilot and aircraft availability. Incidental observations of river otters and river otter tracks were compiled from surveys conducted for other Project studies, however, to help meet the study objective.

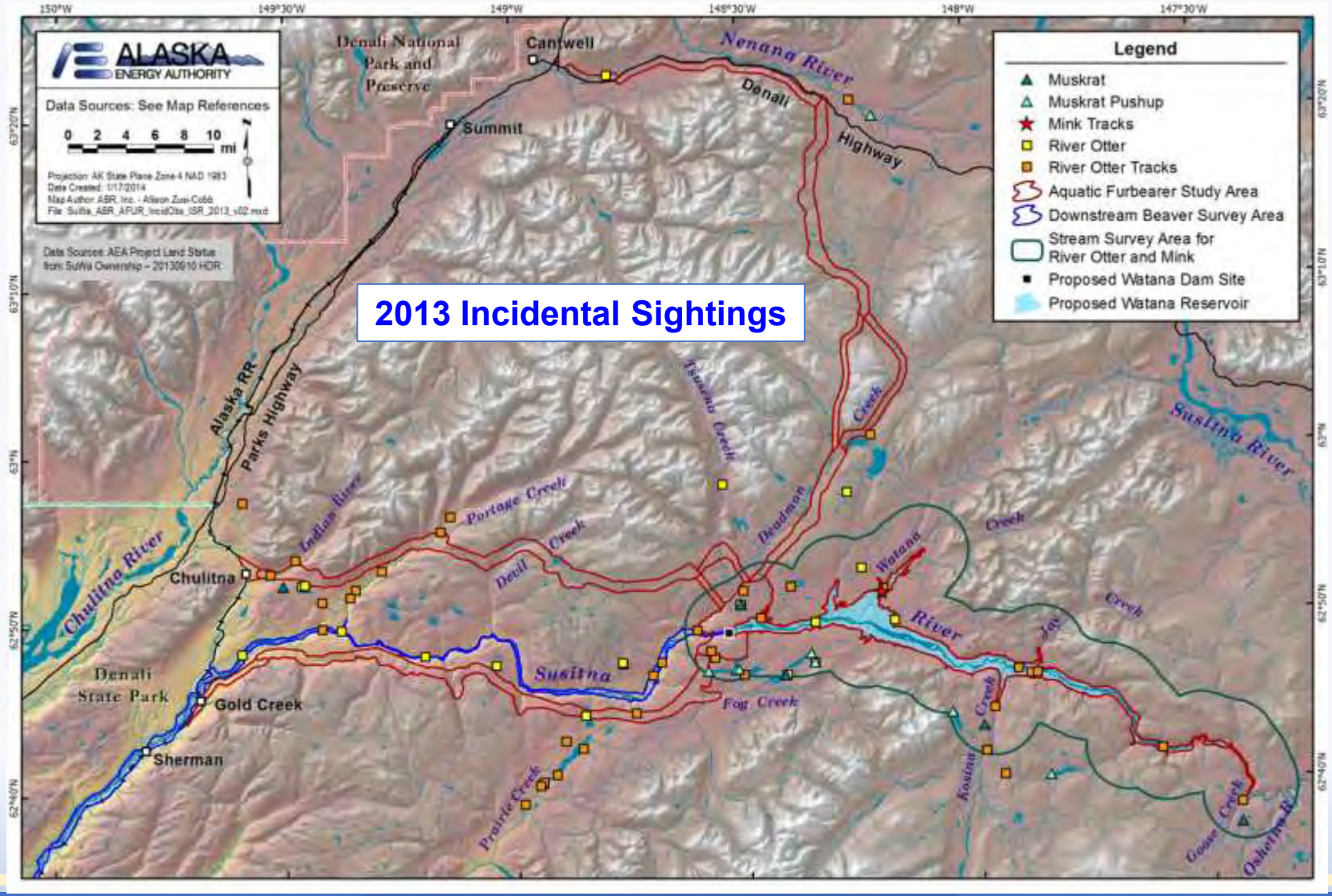
Study 10.11 Summary of Results in ISR (ISR Part A – Section 5)

- In early October 2013, 186 beaver colonies were observed in the survey area and 37.1% were determined to be active, based on the presence of fresh food caches near lodges.
- The study team compiled 60 incidental observations of river otters and river otter tracks and 14 incidental observations of muskrats and muskrat pushups recorded by other Project wildlife studies in 2013.
- A review of scientific literature on the food habits and diets of river otters and mink was undertaken to provide data inputs for the pathways analysis for Study 5.7 (Mercury Assessment and Potential for Bioaccumulation).

Study 10.11 Summary of Results in ISR (ISR Part A – Section 5)



Study 10.11 Summary of Results in ISR (ISR Part A – Section 5)



Study 10.11 Summary of Results since ISR

- Track surveys for river otter and mink were completed on March 7–8 and April 10–11, 2014.
- A survey was conducted on May 2, 2014 to assess overwinter survival of 53 beaver lodges that had been active in fall 2013, producing a minimum estimate of 39% survival over the winter (survival probably was higher, in view of poor survey conditions).
- Eight modified, nonlethal, single-catch snares were deployed at two locations in March–April 2014 to obtain hair samples from river otters. A single sample of 4 hairs was collected at Kosina Creek for analysis of mercury content.

AEA Proposed Modifications to Study 10.11 in ISR (ISR Part C – Section 7.1.2)

- AEA added the Denali East Option (access road and transmission corridor) to the study area.
- The 2013 variance of expanding the beaver survey area to include a broader area of the floodplain along the Middle Susitna River than was originally described in the Study Plan will be continued for the remainder of this study.
- The objectives and methods in this study related to mercury analysis, including the literature review of food habits and diets of river otters and mink and the collection of hair samples, have been consolidated under Study 5.7 (Mercury Assessment and Potential for Bioaccumulation).

New Modifications to Study 10.11 since ISR

The Chulitna Corridor has been dropped from the study area.

Current Status and Steps to Complete Study 10.11

- A second aerial survey of active beaver colonies was conducted in fall 2014 and overwinter survival of those colonies will be assessed on a follow-up survey in spring 2015.
- Additional aerial surveys for river otter and mink tracks will be conducted in winter 2014–2015, pending the occurrence of suitable snow conditions.
- An aerial survey of muskrat pushups will be conducted in spring 2015.
- Cumulative data analyses will be reported in the USR.

Steps to Complete Study 10.11 (ISR Part C – Section 7.1)

To complete this study, AEA will conduct the following surveys:

- Aerial survey of beaver colonies to assess the distribution and abundance of active colonies (fall 2014).
- Aerial survey of those active beaver colonies during the following spring to assess overwinter survival (spring 2015).
- Aerial surveys of river otter and mink tracks along stream courses and transects in winter (winter 2014–2015).
- Aerial surveys of muskrat pushups in waterbodies and wetlands throughout the study area (spring 2015).

Licensing Participants' Proposed Modifications to Study 10.11?

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 10.18 Wood Frog Occupancy and Habitat Use

October 21, 2014

Prepared by

ABR Inc.—Environmental Research & Services

Study 10.18 Objectives

- **Review existing data** on habitat use and distribution of breeding wood frogs.
- **Estimate the occupancy rate** for breeding wood frogs in suitable habitats in the study area through a combination of field surveys and habitat-occupancy modeling.
- Use information on current habitat occupancy and habitat use to estimate the habitat loss and alteration expected to occur from development of the Project.
- **Sample frogs opportunistically for the presence of the amphibian chytrid fungus**, which has been linked to amphibian population declines elsewhere.

Study 10.18 Components

- **Auditory Field Surveys** (ISR Part A, Section 4.1, pg 2)
- **Occupancy Modeling and Habitat Associations** (ISR Part A, Section 4.2, pg 4)
- **Acoustic Monitoring** (ISR Part A, Section 4.3, pg 5)
- **Chytrid Fungus Bioassay** (ISR Part A, Section 4.4, pg 6)

Study 10.18 Variances

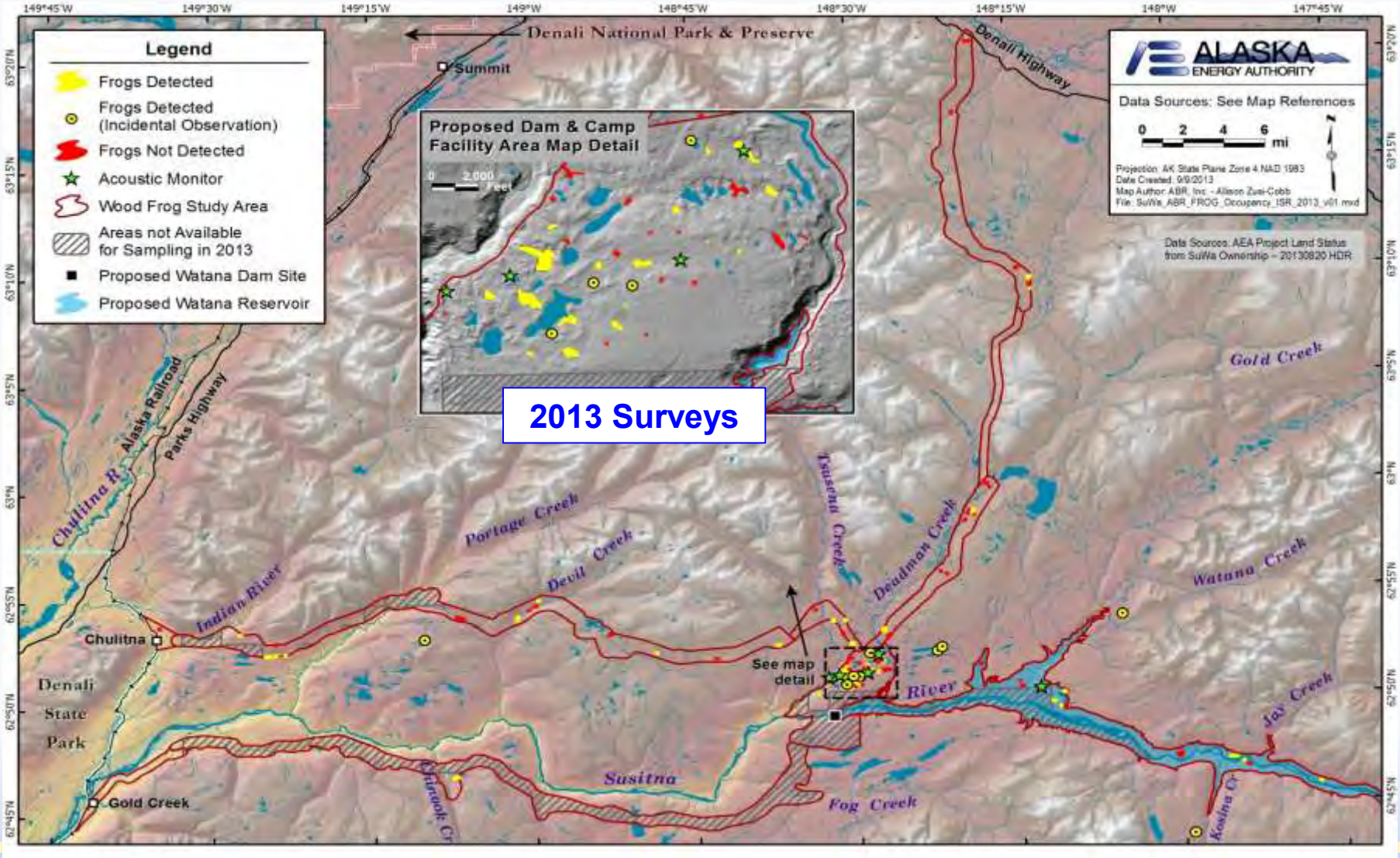
- The methodology for selecting sample locations (RSP Section 10.18.4.1) was adjusted in 2013 for several reasons:
  - Habitat mapping and fish presence data were not yet available for the study area.
  - Access to sampling sites on Cook Inlet Regional Working Group (CIRWG) lands was not permitted, so the Gold Creek Corridor and western portion of the proposed reservoir inundation zone could not be sampled.
  - Diurnal timing of field surveys was adjusted slightly due to logistical challenges.

Study 10.18 Summary of Results in ISR (ISR Part A – Section 5)

2013 Auditory Surveys:

- 90 randomly selected wetlands and waterbodies were sampled from May 30 to June 8 in the proposed reservoir inundation zone, dam/camp infrastructure area, and the Chulitna and Denali West access-road corridors.
- Frogs were widely distributed, from tundra to forested wetlands.
- Frogs were detected at
  - 31.0% of shallow-water (depth ≤1.5 m) locations.
  - 70.8% of deep-water (depth >1.5 m) locations.
- Naïve (uncorrected) estimate of frog occupancy was 52.2%.

Study 10.18 Summary of Results in ISR (ISR Part A – Section 5)



Study 10.18 Summary of Results in ISR (ISR Part A – Section 5)

- **Diurnal pattern of calling activity** recorded by acoustic monitors peaked around 1:00 A.M., declined sharply by 5:00 A.M., then increased throughout the remainder of the day.

- **Estimated detectability** in 2013 (best model of occupancy):
  - 1 visit: 60.6%, nearly identical to 60.8% from acoustic monitor data.
  - 2 visits: 84.5%.
  - 3 visits: 93.9%.

- **Estimated occupancy** in 2013:
  - 36.8% for shallow-water habitats (depth ≤1.5 m).
  - 81.8% for deep-water habitats (depth >1.5 m).
  - **63.4% overall.**

AEA Proposed Modifications to Study 10.18 in ISR (ISR Part C – Section 7.1.2)

- **Add Denali East Corridor Option** to the study area.

- **Drop opportunistic sampling of amphibian chytrid fungus** (RSP Section 10.18.4.2):
  - Based on the small sample of adult frogs captured in 2013 (*n* = 7), this approach was judged unlikely to provide meaningful results for evaluating the presence/absence of chytrid fungus.

New Modifications to Study 10.18 since ISR

The Chulitna Corridor has been dropped from the study area.

Steps to Complete Study 10.18 (ISR Part C – Section 7.1)

To complete this study, AEA implemented the methods in the RSP, except as described in ISR Section 7.1.2. These activities included the following:

- **Conduct auditory field surveys** for habitat-occupancy modeling (RSP Section 10.18.4.1, incorporating variances described in ISR Section 4.1.1), **focusing on areas not sampled in 2013**:
  - CIRWG lands (western reservoir zone and Gold Creek Corridor).
  - Denali East Corridor Option (see ISR Section 7.1.2).
  - High-elevation areas not accessible in 2013 (> 2,500 ft asl).
- **Deploy acoustic monitors at five sites** where frogs are detected on the first visit, to provide additional data on the frequency and duration of calling (RSP Section 10.18.4.1).
- **Both of these activities were completed in 2014.**

Study 10.18 Summary of Preliminary Results since ISR

2014 Auditory Surveys:

- Sampled 104 randomly selected wetlands and waterbodies from May 20 to May 29 in the Gold Creek, Denali West (elevations >2,500 ft asl), and Denali East access-road corridors.
- Frogs were detected at
  - 8.6% of shallow-water (depth ≤1.5 m) locations.
  - 34.7% of deep-water (depth >1.5 m) locations.
- **Naïve (uncorrected) estimate of frog occupancy was 20.2%**.

2014 Acoustic Monitors:

- Battery problems limited acquisition of data for use in evaluating detectability, but diurnal pattern of calling activity was similar to 2013.

Licensing Participants' Proposed Modifications to Study 10.18?

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 10.8 Distribution, Abundance, and Habitat Use by Large Carnivores

October 21, 2014

Prepared by

Alaska Department of Fish and Game

and

ABR, Inc.—Environmental Research & Services

Study 10.8 Objectives

- Estimate the current populations of brown bears, black bears, and wolves in the study area, using existing data from ADF&G.
- Evaluate bear use of streams supporting spawning by anadromous fishes in habitats downstream from the proposed dam that may be altered by the Project.
- Describe the seasonal distribution of, and habitat use by, wolves in the study area, using existing data from ADF&G.
- Synthesize historical and current data on bear movements and seasonal habitat use in the study area, including the substantial body of radio telemetry data from the 1980s, as a continuation of AEA's 2012 study of big-game movements and habitat use.

Study 10.8 Components

- Black Bear and Brown Bear (ISR Part A, Section 4.1, pg 2)
  - Spatial modeling of population density using existing data
  - DNA and stable isotope analyses of hair samples from bears using salmon spawning areas downstream from the proposed dam site

- Wolf (ISR Part A, Section 4.2, pg 5)
  - Analysis of existing data from ADF&G

Study 10.8 Variances

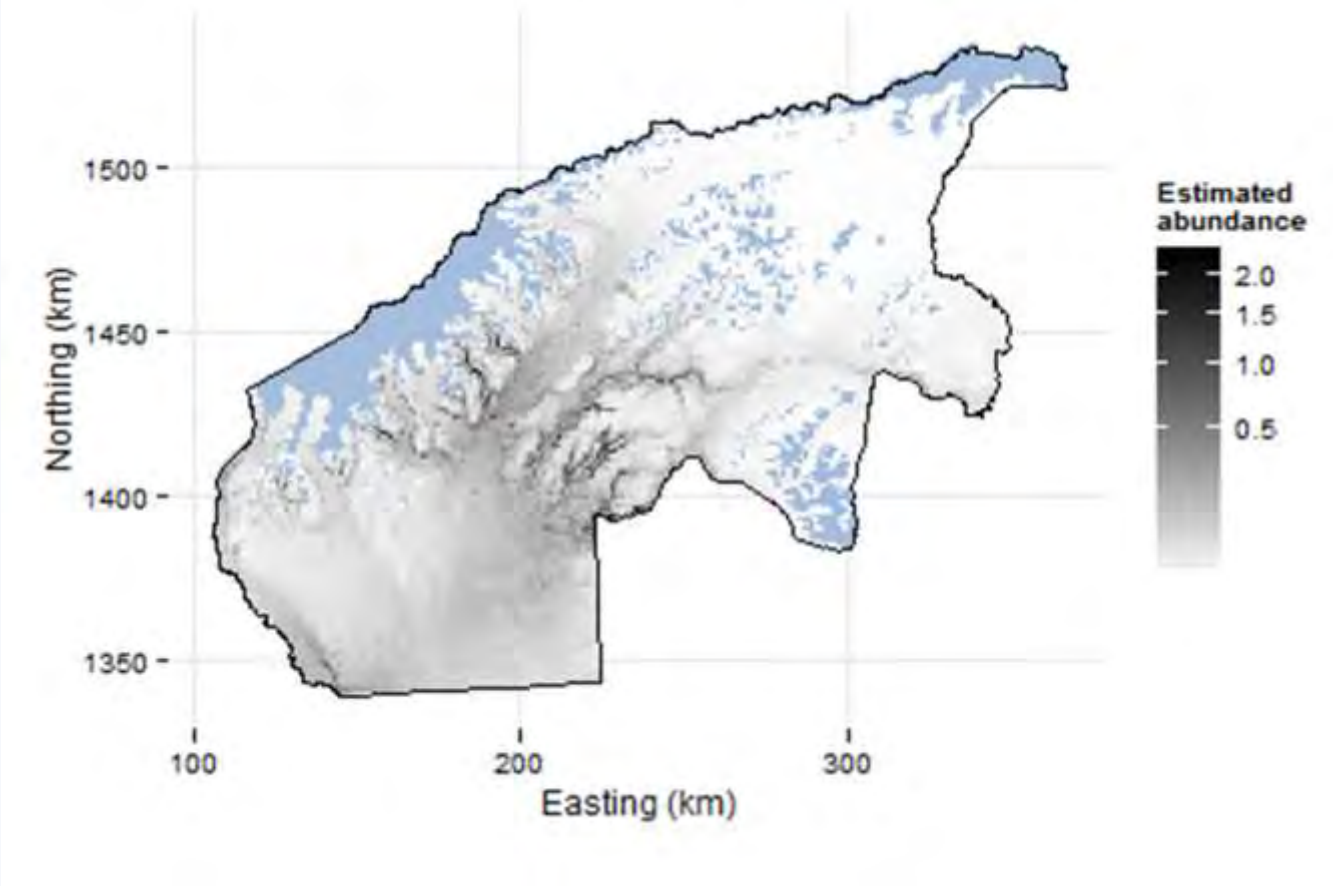
- **Bear data from GMU Subunits 13A and 13B was excluded** from the population estimation analyses. The study team concluded that its exclusion had no appreciable effect on the ability to meet the study objectives.

- Researchers were **unable to access some anadromous streams in 2013** on Cook Inlet Regional Working Group (CIRWG), Alaska Railroad Corporation (ARRC), and some private lands because of a lack of land-access agreements. Therefore, some documented salmon-spawning sites in the Middle Segment of the Susitna River were inaccessible, including all portions of the Middle Segment upstream from PRM 146.5. These limitations on spatial coverage of hair sampling limited the study team's ability to estimate the minimum population size of bears using those spawning streams, as proposed in RSP Section 10.8.4.1.2.

Study 10.8 Summary of Results in ISR (ISR Part A – Section 5)

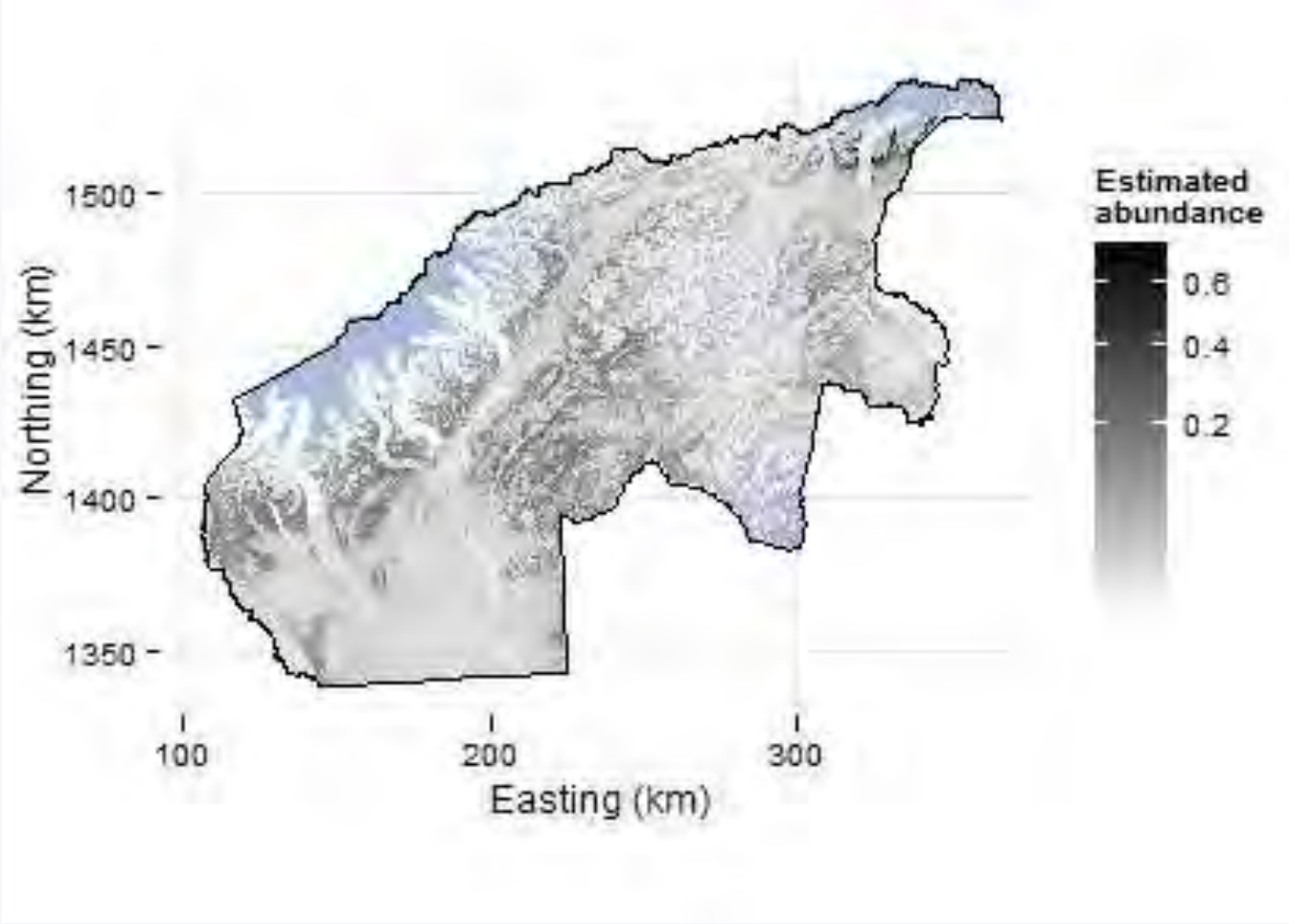
- Data from 1,238 random transects flown by ADF&G in 2000, 2001, and 2003 were reanalyzed by ADF&G to estimate bear density using mark–recapture, multiple-covariate distance models combined with a density surface model.
- The study team estimated that 1,262 black bears inhabited the *study area* during 2000–2003 (95% confidence interval: 972–1,639).
- The study team estimated that 841 brown bears inhabited the *study area* during 2000–2003 (95% confidence interval: 579–1,222).

Study 10.8 Summary of Results in ISR (ISR Part A – Section 5)



Density Surface Map of the Estimated Number of Black Bears per km^2.

Study 10.8 Summary of Results in ISR (ISR Part A – Section 5)



Density Surface Map of the Estimated Number of Brown Bears per km^2.

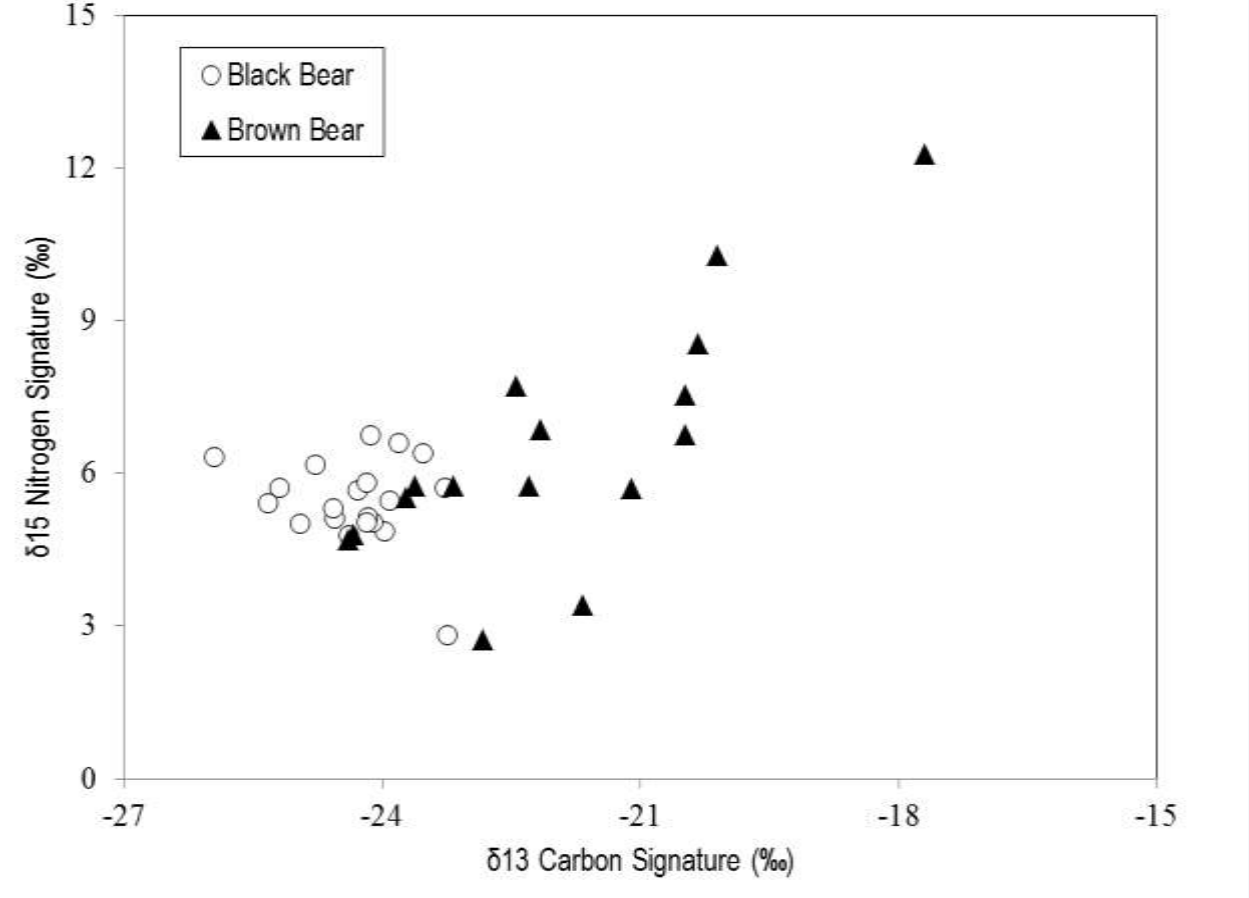
Study 10.8 Summary of Results in ISR (ISR Part A – Section 5)

- A total of 52 modified, nonlethal, single-catch cable snares were set to snag bear hair samples in 12 different locations in 2013, for an average of 49.8 days each, between July 22 and September 25.
- 77 different hair samples (including multiple clumps of hair from some snares) were collected from 34 different snares at 9 sampling locations.

Study 10.8 Summary of Results in ISR (ISR Part B)

- DNA analysis was conducted successfully on 37 samples from 33 tripped snares, identifying 27 different bears:
  - 16 black bears and 11 brown bears.
  - Black bears: 9 females, 6 males, 1 of unknown sex.
  - Brown bears: 9 females, 1 male, 1 of unknown sex.
- Stable isotope analysis was successfully conducted on 79 hair samples.
- Brown bears had higher δ^{13} carbon signatures and a greater range of δ^{15} nitrogen signatures than did black bears, indicating greater proportions of meat and salmon in the diet of the brown bears.

Study 10.8 Summary of Results in ISR (ISR Part B)



Stable isotope signatures for 36 bear-hair samples that were identified to species, 2013.

AEA Proposed Modifications to Study 10.8 in ISR (ISR Part C – Section 7.1.2)

- No modifications to the Study Plan are needed to complete the study and meet the Study Plan objectives.

Steps to Complete Study 10.8 (ISR Part C – Section 7.1)

AEA plans to finish this study in 2015 by completing the following methods, as described in RSP Section 10.8.4:

- Conduct a second year of bear-hair sampling in salmon spawning areas in the Middle Susitna River for analysis of DNA to generate a minimum estimate of the number of bears using the spawning areas and for analysis of stable isotopes to estimate the diets of those bears.
- Obtain additional ADF&G data on wolves in the study area.
- Synthesize historical and current data on bear and wolf populations and habitat use for presentation in the USR.

Licensing Participants' Proposed Modifications to Study 10.8?

- **Agencies**
- **CIRWG members and Ahtna**
- **Public**

Initial Study Report Meeting

Study 10.12 Small Mammal Species Composition and Habitat Use

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 10.12 Objectives

- Describe the **species composition and relative abundance** of small mammals in the Project area.

- Describe the **habitat associations** of small mammals within the Project area.

Study 10.12 Components

- Existing occurrence, relative abundance, and habitat-use data for small mammal species recorded during surveys for the APA Project in the 1980s will be reviewed and summarized (RSP Section 10.12.4).
- Current Project-specific data (on voles only) collected for Study 10.10 (Terrestrial Furbearer Abundance and Habitat Use) will be incorporated, and additional data from recent small mammal studies in south-central and interior Alaska also will be reviewed and synthesized with the above data (RSP Section 10.12.4).
- As noted in RSP Section 10.12.4, the information for small mammals derived from the data synthesis will be aligned with the wildlife habitat types being mapped for Study 11.5 (Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin).
- Data will then be used to rank wildlife habitat values for small mammal species for each mapped habitat type in Study 10.19 (Evaluation of Wildlife Habitat Use).

Study 10.12 Variances

- This study was deferred until 2015, rather than being implemented primarily in 2013, as was proposed in the Study Plan (RSP Sections 10.12.6 and 10.12.10). The study involves the use of existing data and can be completed in one study year.
- As described in RSP Section 10.12.4, the study will be informed by the final mapping data produced for Study 11.5 (Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin), as well as by data collected for Study 10.10 (Terrestrial Furbearer Abundance and Habitat Use).

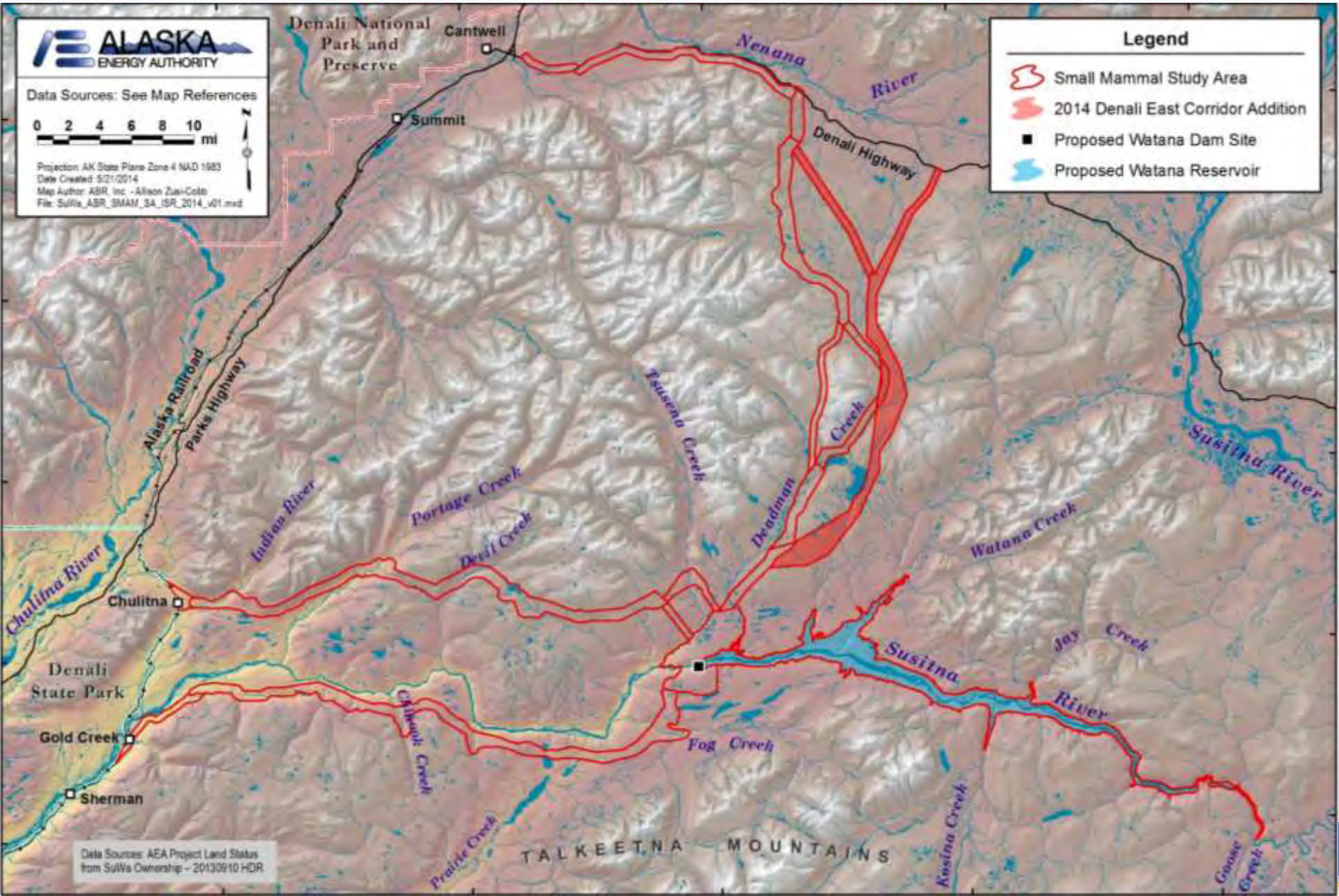
Study 10.12 Summary of Results in ISR (ISR Part A – Section 5)

This study has not been initiated; the study will be completed in 2015 and the findings will be reported in the USR.

AEA Proposed Modifications to Study 10.12 in ISR (ISR Part C – Section 7.1.2)

- No modifications to the Study Plan methods are needed to complete this study and meet the Study Plan objectives.
- However, the study area has changed from that described in the Study Plan (RSP Section 10.12.3), with the addition of the alternative Denali East Option (access road and transmission line corridor).

AEA Proposed Revision to Study Area (ISR Part C – Section 7.1.2)



New Modifications to Study 10.12 since ISR

The Chulitna Corridor has been dropped from the study area.

Steps to Complete Study 10.12 (ISR Part C – Section 7.1)

- Review, analysis, and synthesis of existing data on the occurrence, relative abundance, and habitat use of small mammal species.
- Incorporation of additional information on abundance and habitat use by voles from Study 10.10 (Terrestrial Furbearer Abundance and Habitat Use).
- Results of the data synthesis will be applied to the wildlife habitat types mapped for Study 11.5 (Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin), and categorical habitat values for small mammal species will be assigned for Study 10.19 (Evaluation of Wildlife Habitat Use).

Licensing Participants' Proposed Modifications to Study 10.12?

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 10.20 Wildlife Harvest Analysis

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 10.20 Objectives

- Summarize past and current **harvest effort, harvest locations, and access modes and routes for large and small game**, including furbearers.
- **Compare current harvest locations** of large and small game, including furbearers, **with data on the seasonal distribution, abundance, and movements of harvested species**, using results from other Project studies of big game and furbearer species (Studies 10.5–10.11).
- **Provide harvest data** for use in analyses to be conducted for the recreation and subsistence resources (Studies 12.5 and 14.5, respectively).

Study 10.20 Components

- Compilation and analysis of ADF&G harvest database records.
- Review of ADF&G game management reports.
- Review of ADF&G trapper questionnaires.
- Review of ADF&G small game outlook and harvest surveys.
- Review of ADF&G and USFWS subsistence surveys and harvest reports.
- Interviews with regional biologists.
- Comparison of harvest patterns with the current distribution of game mammals and birds and development plans in the Project area.

Study 10.20 Variances

- The study was deferred until 2015, rather than being initiated in 2013, as proposed in the Study Plan (RSP Section 10.20.10). The study involves the use of existing data and can be completed in one study year.

Study 10.20 Summary of Results in ISR (ISR Part A – Section 5)

- No work has been initiated on this study; the study will be completed in 2015 and the findings will be reported in the USR.

AEA Proposed Modifications to Study 10.20 in ISR (ISR Part C – Section 7.1.2)

- No modifications to the Study Plan are needed to complete this study and meet the Study Plan objectives.

Steps to Complete Study 10.20 (ISR Part C – Section 7.1)

- Compilation and analysis of ADF&G harvest database records.
- Review of ADF&G game management reports.
- Review of ADF&G trapper questionnaires.
- Review of ADF&G small game outlook and harvest surveys.
- Review of ADF&G and USFWS subsistence surveys and harvest reports.
- Interviews with regional biologists.
- Comparison of harvest patterns with the current distribution of game mammals and birds and development plans in the Project area.

Licensing Participants' Proposed Modifications to Study 10.20?

- **Agencies**
- **CIRWG members and Ahtna**
- **Public**

Initial Study Report Meeting

Study 10.19 Evaluation of Wildlife Habitat Use

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 10.19 Objectives

- Use Project-specific survey data and scientific literature to **determine local habitat associations** for selected wildlife species occurring in the Project area that are of conservation, management, subsistence/cultural, or ecological concern.

- Categorically **rank habitat values** for each selected wildlife species for each of the wildlife habitat types being mapped for the Project.

Study 10.19 Components

- Selection of bird, mammal, and amphibian species for assessment, emphasizing species that are of conservation, management, subsistence/cultural, or ecological concern
(RSP Section 10.19.4.1).

- Categorically rank habitat values for each species and local mapped habitat type using Project-specific survey data as much as possible and the scientific literature when local data are not available (RSP Section 10.19.4.1).

Study 10.19 Variances

- The selection of species and the initial literature review for this study have been deferred to 2015, rather than being initiated in 2013 as proposed in RSP Section 10.19.6. This study involves the use of data from other studies and can be completed in one study year.
- This study cannot be completed until mapping and data are available from Study 11.5 (Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin), Study 11.6 (Riparian Vegetation Study Downstream of the Proposed Susitna-Watana Dam), and various wildlife studies (Studies 10.5 through 10.18), as described in RSP Section 10.19.4.

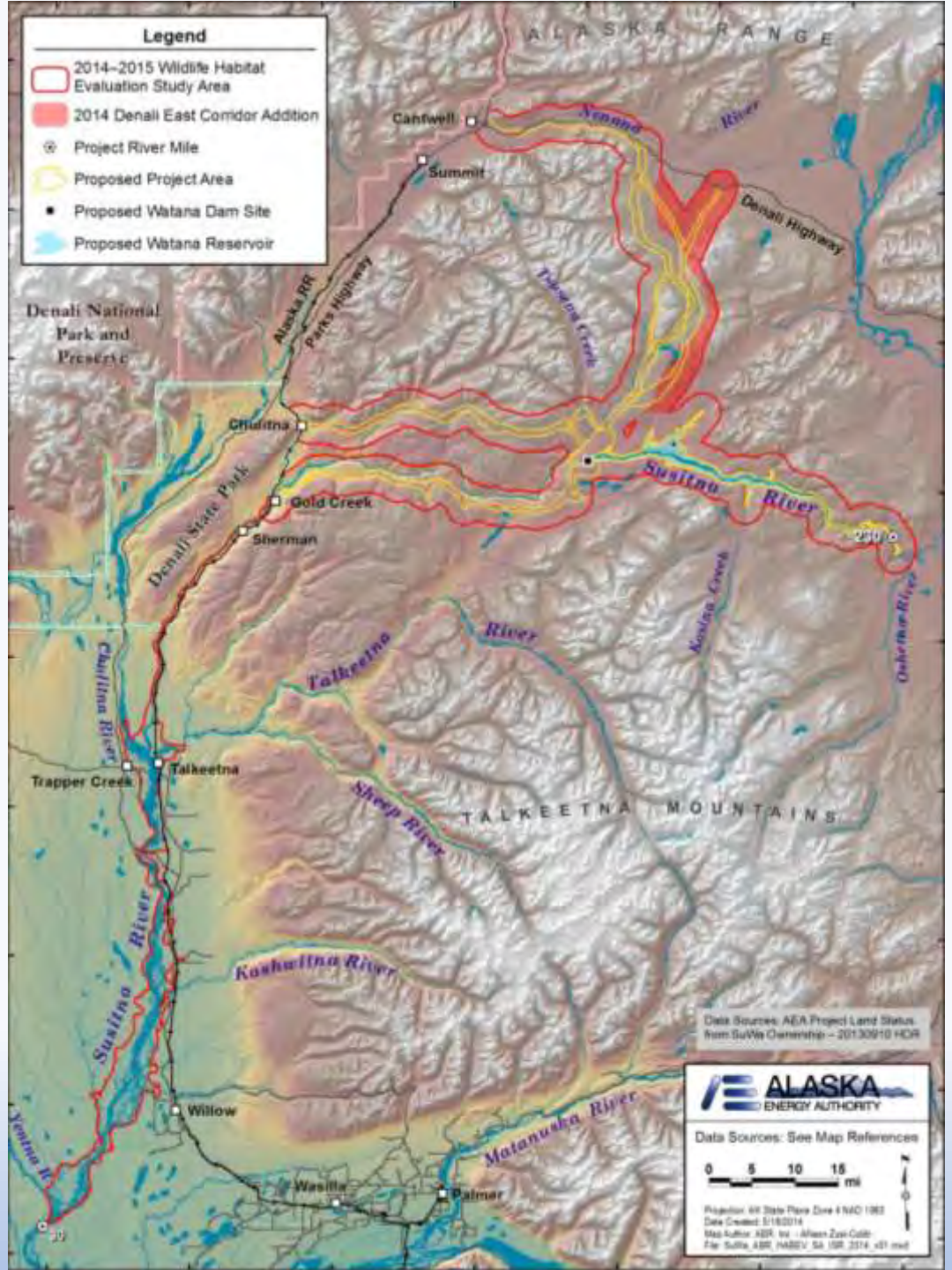
Study 10.19 Summary of Results in ISR (ISR Part A – Section 5)

- No work has been initiated on this study; the study will be completed in 2015 and the findings will be reported in the USR.

AEA Proposed Modifications to Study 10.19 in ISR (ISR Part C – Section 7.1.2)

- The 4-mile study area buffer surrounding the proposed Project areas and access road/transmission alignments has been reduced to a 2-mile buffer. This change corresponds directly to the reduction of the study area buffer for Study 11.5 (Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin) because the habitat data for the Project area used in this study will come from the habitat map prepared for Study 11.5.
- AEA added the alternative Denali East Option (access road and transmission line corridor) to the study area; for this study, the new corridor includes a 2-mile buffer surrounding the road and transmission line alignments for the Denali East Option.
- In contrast to a selected set of bird species of concern for analysis, as described in the RSP, each bird species recorded in the study area will be ranked for habitat values for each mapped wildlife habitat type. This modification will increase the amount of information available to assess impacts on bird species from the proposed Project.

AEA Proposed Revision to Study Area (ISR Part C – Section 7.1.2)



New Modifications to Study 10.19 since ISR

The Chulitna Corridor has been dropped from the study area.

Steps to Complete Study 10.19 (ISR Part C – Section 7.1)

Following completion of the Project-specific wildlife habitat mapping and wildlife surveys:

- Select mammal species to evaluate for habitat use (all bird species recorded in the Project area will be evaluated, as will the single amphibian species).
- Use Project-specific wildlife survey data (from Studies 10.5 through 10.18) and, when needed, from the scientific literature to assess habitat associations for the species selected for evaluation.
- Categorically rank habitat values for each selected wildlife species for each of the wildlife habitat types being mapped in the study area (i.e., the combined study areas for Studies 11.5 and 11.6).

Licensing Participants' Proposed Modifications to Study 10.19?

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 11.5 Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 11.5 Objectives

- Classify, delineate, and map existing vegetation and wildlife habitats in the Upper and Middle Susitna River Basin based on current aerial photos and satellite imagery—mapping is conducted for the Project dam site and reservoir area and along the possible transmission line/road corridors (areas that would be directly altered or disturbed by Project construction and operations)
- Vegetation mapping will be used to assess vegetation impacts, and wildlife habitat mapping will be used by wildlife researchers in the assessment of impacts to bird and mammal habitats

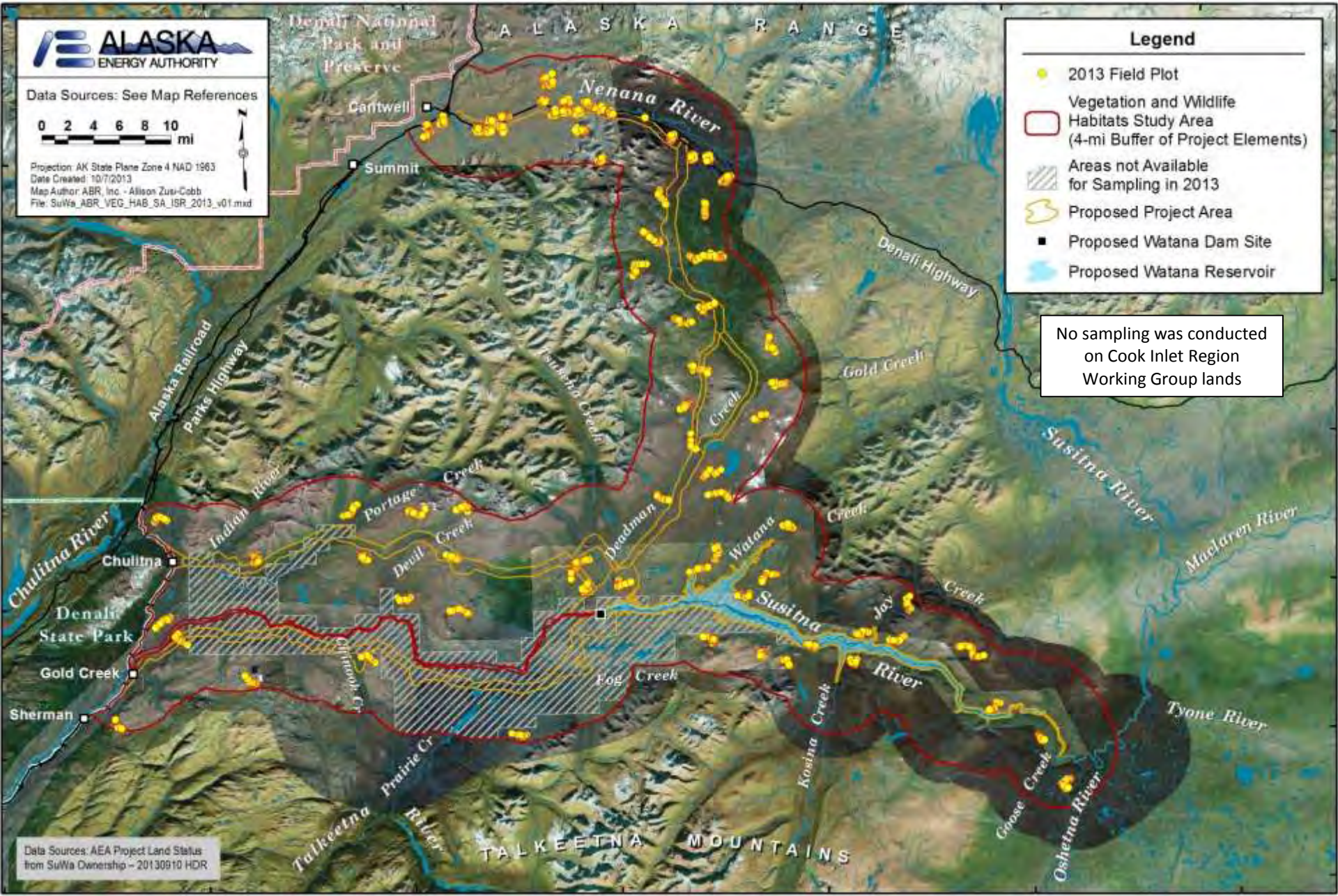
Study 11.5 Components

- Develop mapping materials from historical (APA Project) and current data (ISR Part A, Section 4.1, p. 3)
- Field surveys to collect ground-reference data for the mapping work (ISR Part A, Section 4.3, p. 5)
- Integrated Terrain Unit (ITU) mapping and derivation of wildlife habitats (ISR Part A, Section 4.2, p. 4)
- The study is being conducted in close coordination with the Wetland Mapping Study in the Upper and Middle Susitna Basin (Study 11.7); data are being collected for both studies at each sample plot in the field, and the mapping efforts for both studies are being performed concurrently

Study 11.5 Variances

There were no variances from the methods for the development of mapping materials, field surveys, or the ITU mapping described in the RSP (Section 11.5.4).

Study 11.5 Summary of Results in ISR (ISR Part A – Section 5)

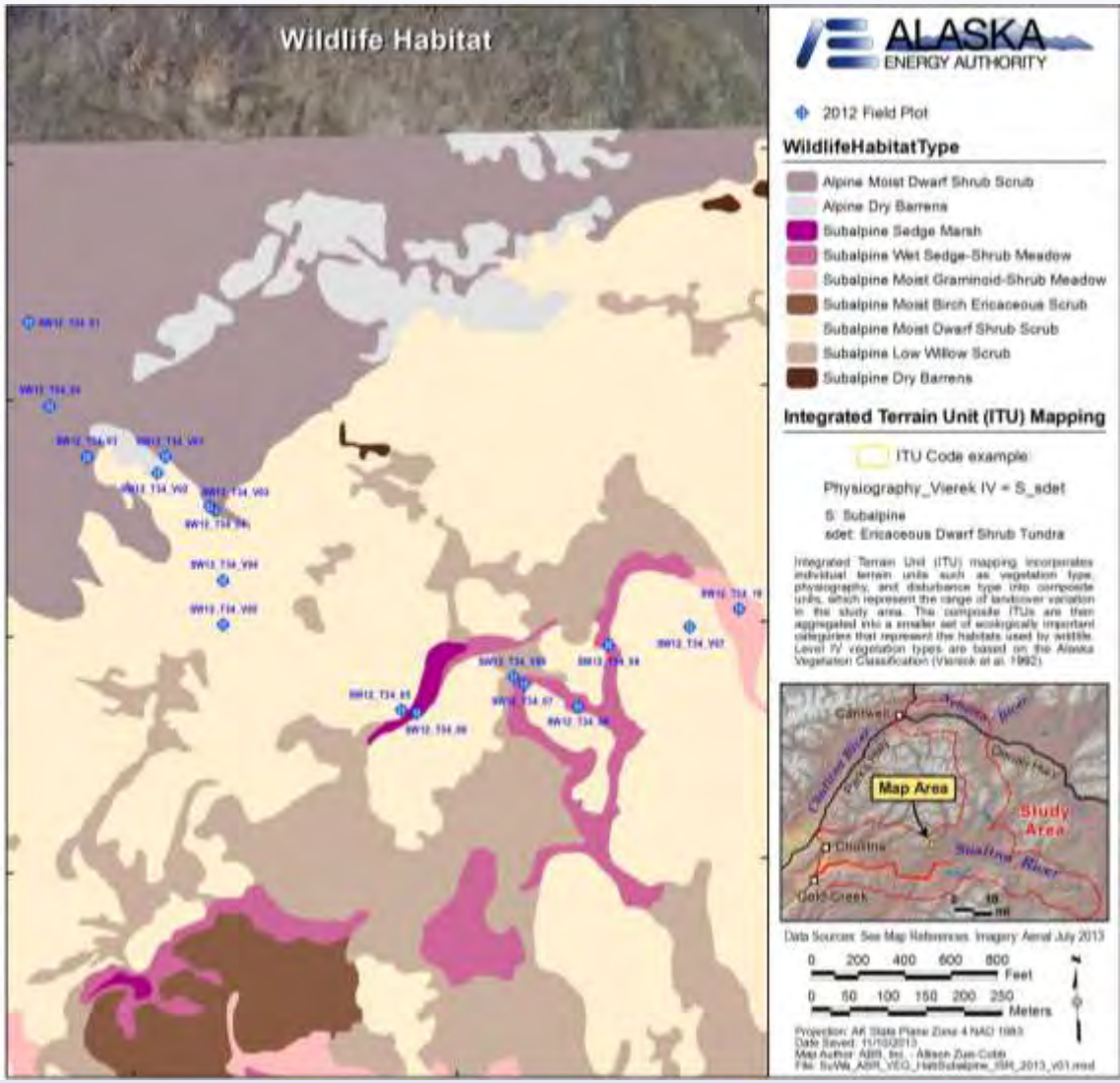


Study 11.5 Summary of Results in ISR (ISR Part A – Section 5)

- Field surveys conducted in early July and early August, 2013; a total of 916 plots were sampled (619 full plots and 297 rapid map verification plots on 77 transects)
- ITU mapping is ongoing, expected to be completed in 2015; example mapping map areas presented in the ISR
- ITU attributes recorded for each map polygon include:
  - Alaska Vegetation Classification (AVC) Level IV vegetation class
  - Physiographic type
  - Surface form type
  - Disturbance type, when applicable
  - National Wetlands Inventory (NWI) wetland class *
  - Hydrogeomorphic (HGM) wetland class *

* For use in the Wetland Mapping Study in the Upper and Middle Susitna Basin (Study 11.7)

Study 11.5 Summary of Results in ISR (ISR Part A – Section 5)



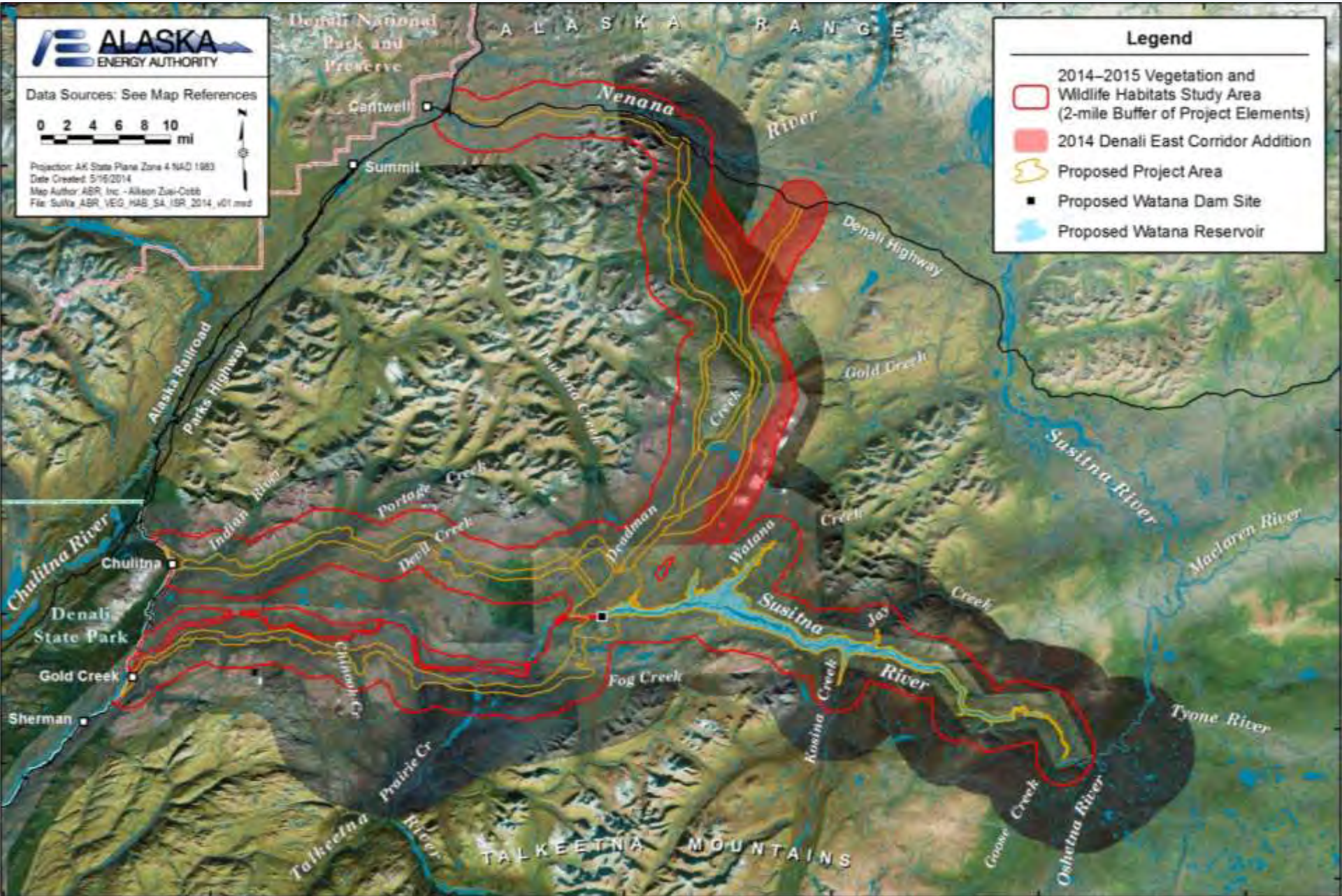
Study 11.5 Summary of Results since ISR

- No additional field surveys or data analyses have been conducted since the release of the ISR;
- ITU mapping occurred in 2014.

AEA Proposed Modifications to Study 11.5 in ISR (ISR Part C – Section 7.1.2)

- The original 4-mi study area buffer has been reduced to a 2-mi buffer to match the study areas for two closely related studies (Study 11.7 – wetlands mapping, and Study 10.16 – landbirds and shorebirds). The study team along with the wildlife researchers on the Project have determined that:
  - As for wetlands, with the new 2-mi mapping area buffer, local-scale Project effects on vegetation can be adequately quantified and assessed; and
  - The 2-mi buffer will be sufficient to adequately assess local-scale Project effects on wildlife habitats, both for direct impacts (habitat loss) and indirect impacts (habitat alteration).
- The study area has changed from that described in the RSP (Section 11.5.3), with the addition of the alternative Denali Corridor East Option road and transmission line corridor. The addition of this new corridor to the study area includes a 2-mi buffer surrounding the road and transmission line alignments for the Denali Corridor East Option.

AEA Proposed Revision to Study Area (ISR Study 11.5, Part C – Section 7.1.2)



New Modifications to Study 11.5 since ISR

The Chulitna Corridor has been dropped from the study area.

Current Status Study 11.5

- In 2013, field surveys were completed as described in the RSP (Section 11.5.4.3) with no variances; no field surveys were conducted in 2014.
- In 2014, the two modifications to the study area, described above and in the ISR (Study 11.5, Part C, Section 7.1.2), were implemented for the ITU mapping work; the study area modifications will be used also during the final field surveys in 2015.
- In 2013 and 2014, the mapping of vegetation and the three other ITU variables needed to derive wildlife habitats, as described in the RSP (Section 11.5.4.2), was continued.

Steps to Complete Study 11.5 (ISR Part C – Section 7.1)

- Field ground-reference data for the ITU mapping will be collected in 2015 on CIRWG lands, which have not yet been sampled.
- Additional field data also will be collected for vegetation types and wildlife habitats not adequately sampled during 2012 and 2013.
- Completion, review, and finalization of the ITU mapping in the revised study area to be completed in 2015.
- A final set of wildlife habitats will be developed in 2015 in coordination with researchers working on the wildlife studies (Studies 10.5 through 10.18) and the Riparian Vegetation Study Downstream of the Proposed Susitna Watana Dam (Study 11.6).
- Each of these tasks will be accomplished as described in the ISR.

Licensing Participants Proposed Modifications to Study 11.5?

- Agencies
- CIRWG members and Ahtna
- Public

Initial Study Report Meeting

Study 11.7 Wetland Mapping Study in the Upper and Middle Susitna Basin

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 11.7 Objectives

- Classify, delineate, and map existing wetlands in the Upper and Middle Susitna River Basin based on current aerial photos and satellite imagery—mapping is conducted for the Project dam site and reservoir area and along the possible transmission line/road corridors (areas that would be directly altered or disturbed by Project construction and operations)
- Determine and evaluate the ecological functions of the mapped wetland types to facilitate an assessment of the relative value of the mapped wetland types in the study area

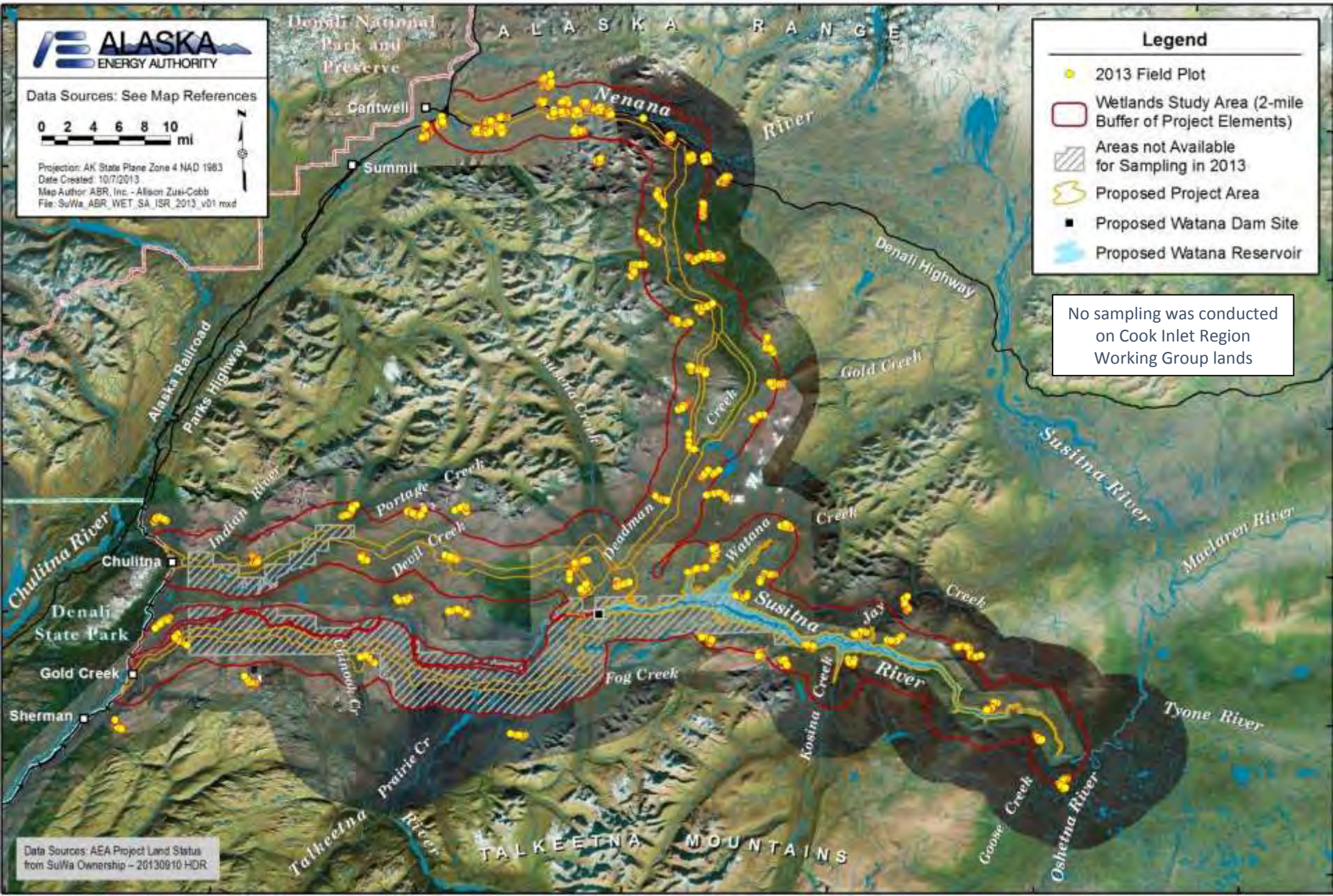
Study 11.7 Components

- **Field surveys to collect ground-reference data for the wetlands mapping work** (ISR Part A, Section 4.2, p. 5)
- **Multivariate wetlands mapping incorporating wetland function—based on three classification systems** (ISR Part A, Section 4.1, p. 3)
- **Preparation of a wetland functional assessment for each mapped wetland type** (ISR Part A, Section 4.3, p. 7)
- The study is being conducted in close coordination with the Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin (Study 11.5); data are being collected for both studies at each sample plot in the field, and the mapping efforts for both studies are being performed concurrentlys

Study 11.7 Variances

There were no variances from the field survey, wetland classification and mapping, or the functional assessment methods described in the RSP (Section 11.7.4).

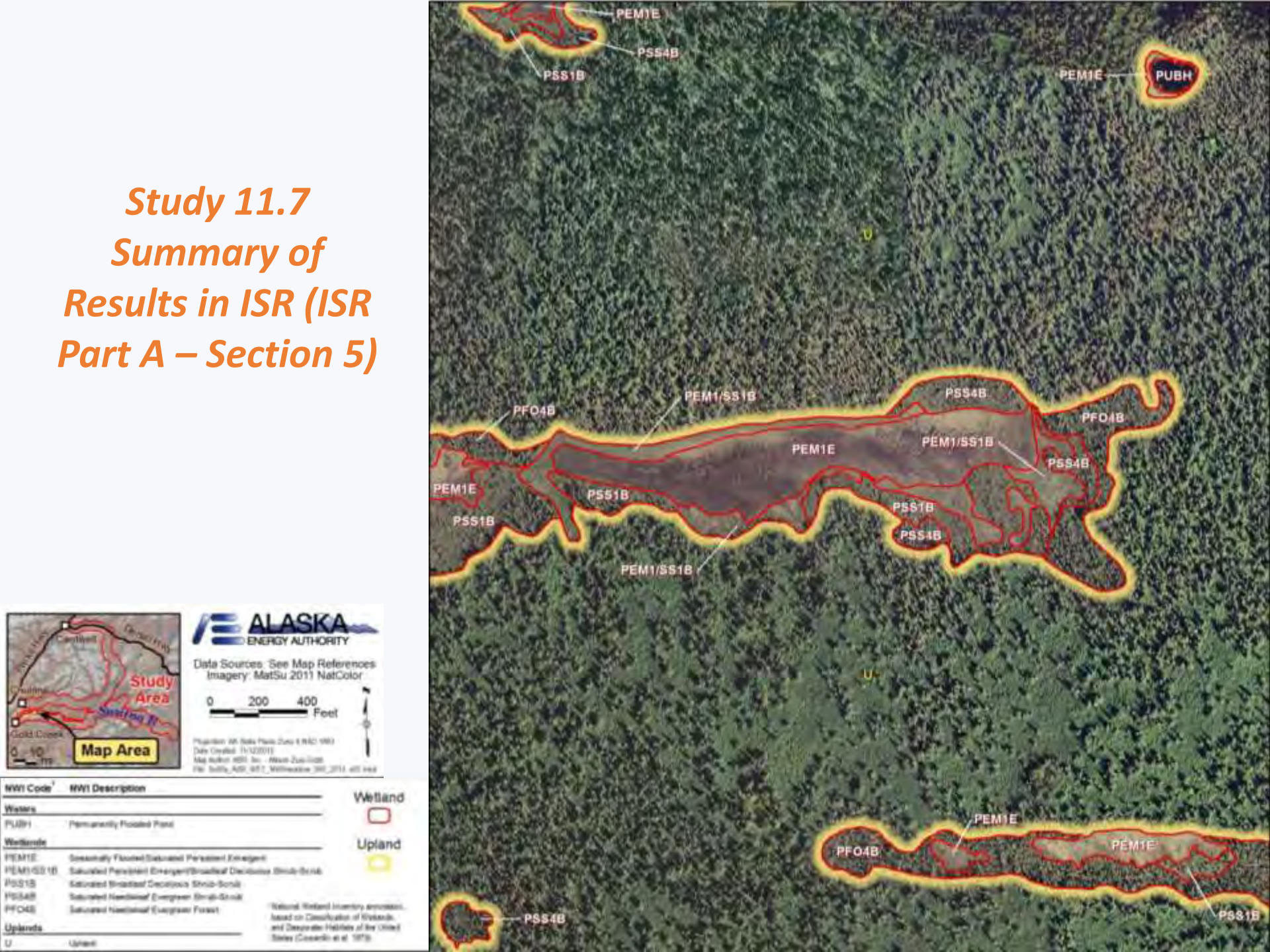
Study 11.7 Summary of Results in ISR (ISR Part A – Section 5)



Study 11.7 Summary of Results in ISR (ISR Part A – Section 5)

- Field surveys conducted in early July and early August, 2013; a total of 916 plots were sampled (619 full plots and 297 rapid map verification plots on 77 transects)
- Formal wetland determinations and wetland functional assessment data were collected at the 619 full plots
- Wetlands mapping is ongoing and is expected to be completed in 2015; example mapping map areas presented in the ISR
- Attributes recorded for each map polygon include:
  - National Wetlands Inventory (NWI) wetland class
  - Hydrogeomorphic (HGM) wetland class
  - Alaska Vegetation Classification (AVC) Level IV vegetation class
  - Physiographic type
  - Surface form type
  - Disturbance type, when applicable

Study 11.7 Summary of Results in ISR (ISR Part A – Section 5)



Study 11.7 Summary of Results since ISR

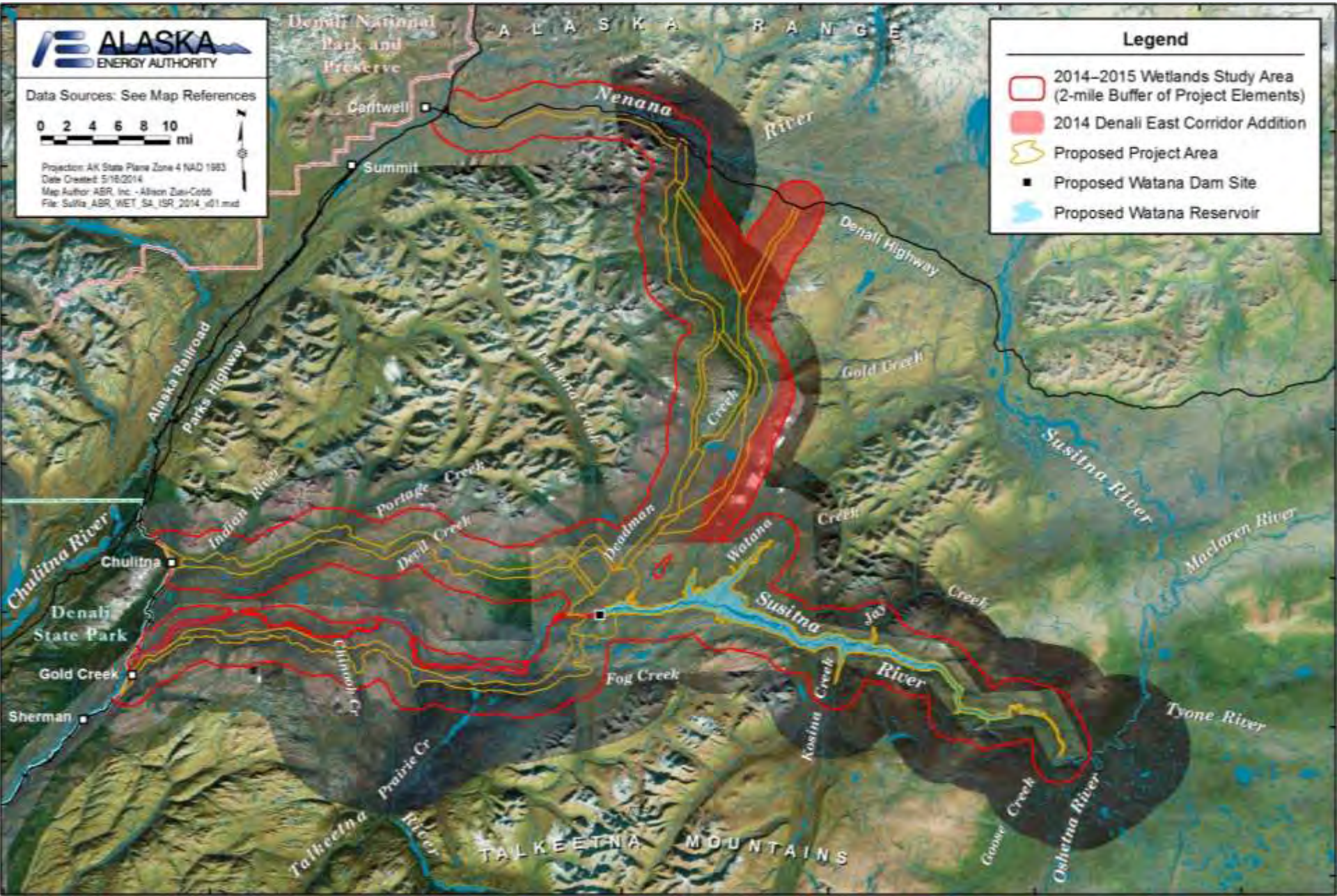
No additional field surveys or data analyses have been conducted since the release of the ISR; only wetlands mapping has occurred in 2014.

AEA Proposed Modifications to Study 11.7 in ISR (ISR Part C – Section 7.1.2)

- No modifications to the Study Plan methods are proposed to complete this study and meet the Study Plan objectives.

- However, the study area has changed from that described in the RSP (Section 11.7.3), with the addition of the alternative Denali Corridor East Option road and transmission line corridor. The addition of this new corridor to the study area includes a 2-mi buffer surrounding the road and transmission line alignments for the Denali Corridor East Option.

AEA Proposed Revision to Study Area (ISR Study 11.7, Part C – Section 7.1.2)



New Modifications to Study 11.7 since ISR

The Chulitna Corridor has been dropped from the study area.

Current Status Study 11.7

- In 2013, field surveys were completed as described in the RSP (Section 11.7.4.2) with no variances; no field surveys were conducted in 2014.
- In 2014, one modification to the study area, described above and in the ISR (Study 11.7, Part C, Section 7.1.2), was implemented for the ITU mapping work; the study area modification will be used also during the final field surveys in 2015.
- In 2013 and 2014, the mapping of wetlands, as described in the RSP (Section 11.7.4.1), was continued.

Steps to Complete Study 11.7 (ISR Part C – Section 7.1)

- Field wetland determination and wetland functional assessment data will be collected in 2015 on CIRWG lands, which have not yet been sampled.
- Additional field data also will be collected for wetland types not adequately sampled during 2012 and 2013.
- Completion, review, and finalization of the wetlands mapping in the revised study area to be completed in 2015.
- A final set of wetland types that apply Project-wide and that incorporate wetland-function information will be developed in 2015—to be conducted in coordination with the Riparian Vegetation Study Downstream of the Proposed Susitna-Watana Dam (Study 11.6).

Steps to Complete Study 11.7 (ISR Part C – Section 7.1)

- Revisions to the wetland functional assessment model to make the wetland functions assessed more representative of the largely undisturbed conditions in the study area.
- Incorporation of spatially specific information in the wetland functional assessment model for fish and wildlife occurrence, recreation, and subsistence use—data from the fish distribution and abundance and fish habitat studies (Studies 9.5, 9.6, and 9.9), the wildlife studies (Studies 10.5 through 10.18), the Recreation Resources Study (Study 12.5), and the Subsistence Baseline Documentation Study (Study 14.5).
- Development of a final set of wetland functional classes, which will represent groups of wetland types sharing similar wetland functions.
- Each of these tasks will be accomplished as described in the ISR.

Licensing Participants Proposed Modifications to Study 11.7?

- **Agencies**
- **CIRWG members and Ahtna**
- **Public**

Initial Study Report Meeting

Study 11.8
Rare Plants

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 11.8 Objectives

- Identify habitats in the Project area that may support rare vascular plant species, which were previously found within a broad region surrounding the Project area
- Search those habitats in portions of the Project area that would be disturbed by Project construction and operations activities for populations of rare vascular plant species
- Map the locations and estimate population sizes for any rare species found

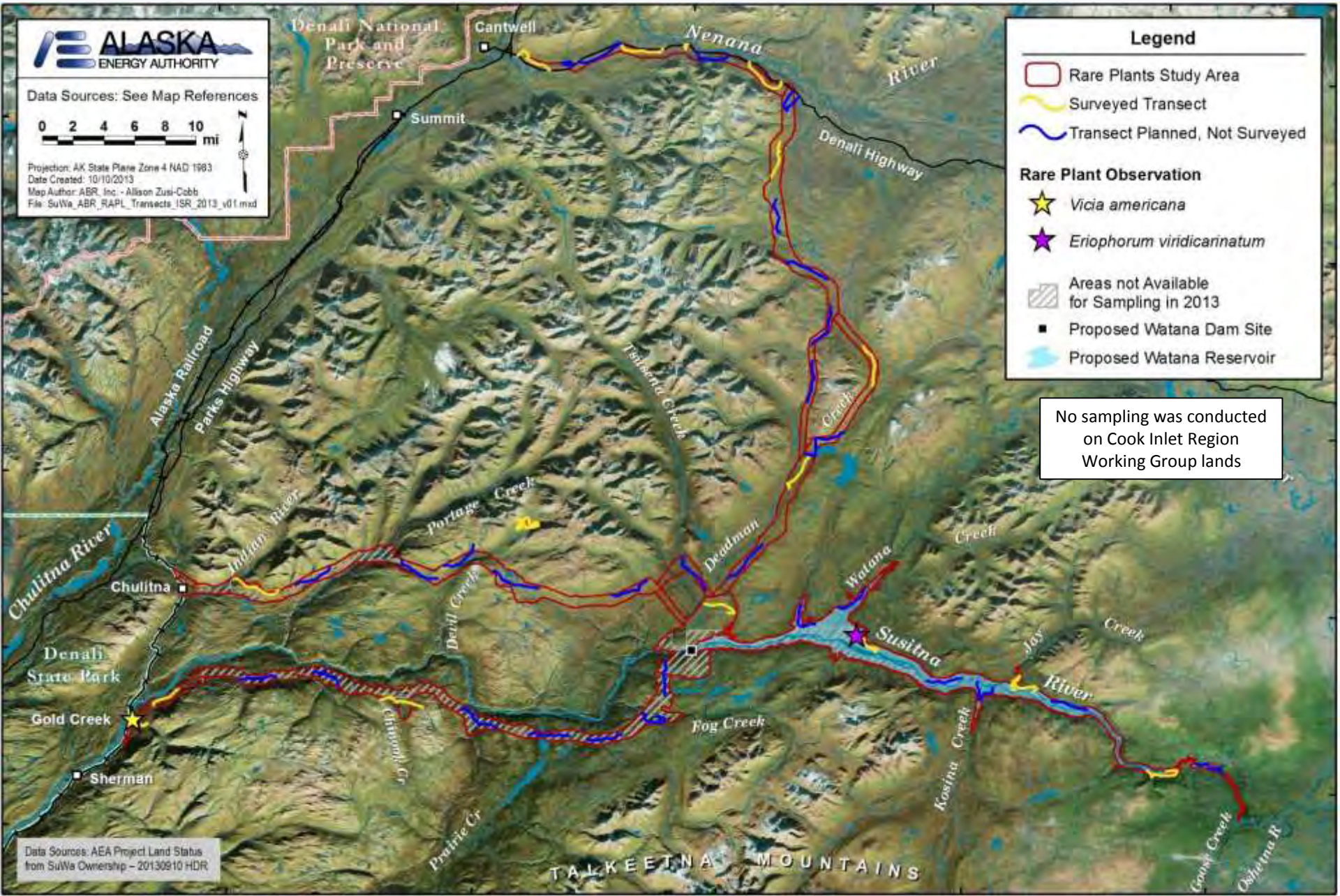
Study 11.8 Components

- Selection of focal species and habitats in which to search for rare plant populations—using data from the records of rare plants previously collected in a broad region surrounding the Project area (ISR Part A, Section 4.1, p. 2)
- Work focused on those species listed as more rare within the state (S1, S1S2, S2, and S2S3 rankings) by the Alaska Natural Heritage Program (ISR Part A, Section 4.1, p. 2)
- Field surveys for rare vascular plant taxa (ISR Part A, Section 4.2, p. 3)

Study 11.8 Variances

There were no variances from the methods for the selection of focal species and habitats, and the field surveys for rare plants as described in the RSP (Section 11.8.4.1)

Study 11.8 Summary of Results in ISR (ISR Part A – Section 5)



Study 11.8 Summary of Results in ISR (ISR Part A – Section 5)

- Field surveys conducted in early July and early August, 2013; a total of 16 transects were sampled
- Two rare species were found; both identifications have been confirmed by UAF Herbarium staff:
  - *Vicia americana (*American vetch; S2*)* was found at Gold Creek Camp at the western end of the Gold Creek Corridor
  - *Eriophorum viridicarinatum* (thinleaf cottonsedge; S2S3) was found on a terrace above the Susitna River in the proposed Watana Reservoir near PRM 199; it was also found by other botanical field crews outside of the rare plant study area
- Several other rare taxa were found in other Project botanical studies (identifications yet to be confirmed)

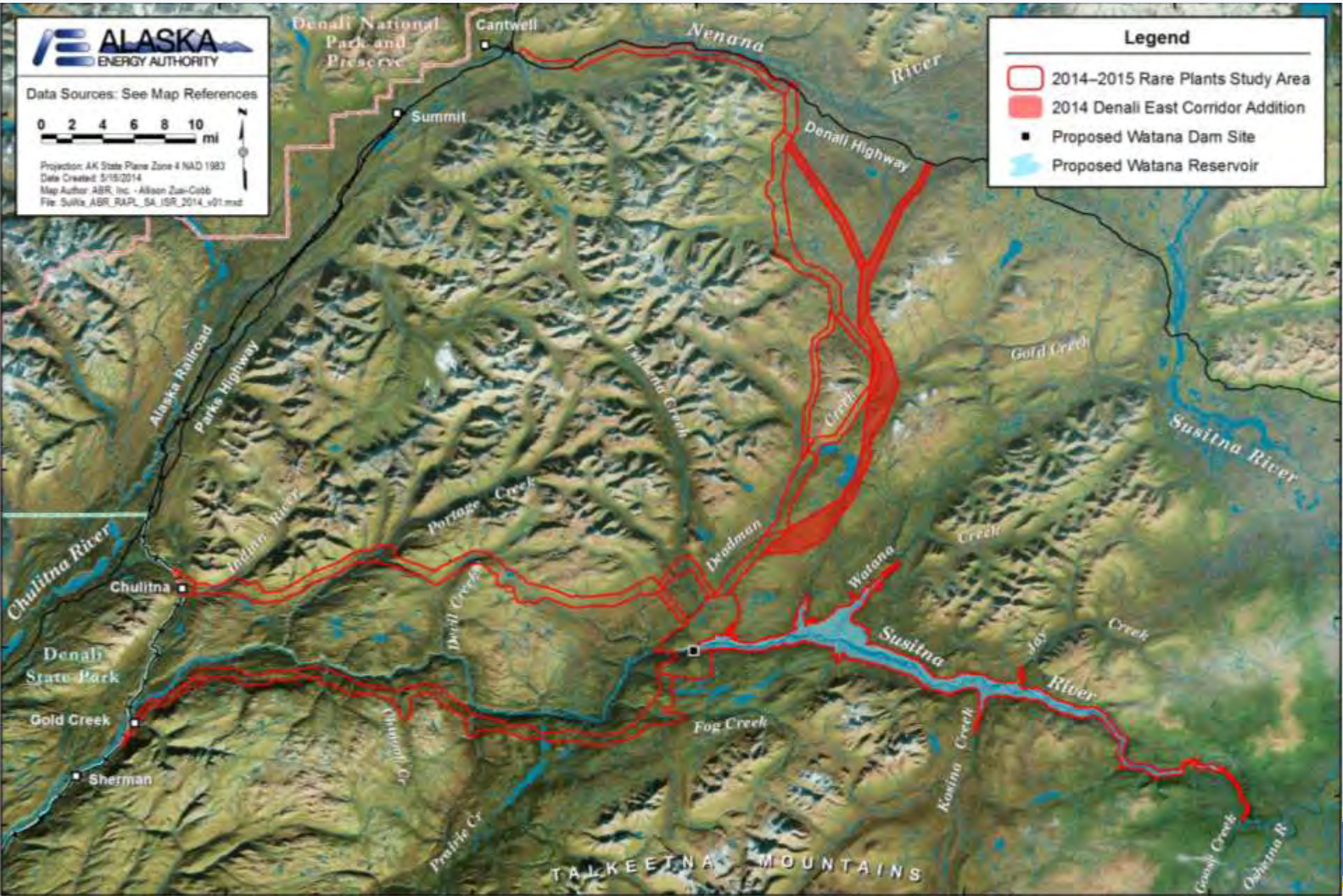
Study 11.8 Summary of Results since ISR

No additional work has been conducted for this study since submittal of the ISR.

AEA Proposed Modifications to Study 11.8 in ISR (ISR Part C – Section 7.1.2)

- No modifications to the Study Plan methods are needed to complete this study and meet the Study Plan objectives.
- However, the study area has changed from that described in the RSP (Section 11.8.3), with the addition of the alternative Denali Corridor East Option road and transmission line corridor. The corridor addition to the study area includes the Project area buffer surrounding the road and transmission line alignments of new Denali Corridor East Option.

AEA Proposed Revision to Study Area (ISR Study 11.8, Part C – Section 7.1.2)



New Modifications to Study 11.8 since ISR

The Chulitna Corridor has been dropped from the study area.

Current Status Study 11.8

- In 2013, field surveys for rare plants were completed as described in the RSP (Section 11.8.4.1) with no variances; no field surveys were conducted in 2014.
- In 2013, the study team was able to sample a wide range of habitat types in the study area that could have harbored rare plants, as described in the RSP (Section 11.8.4.1), and found two rare species.
- Due to access restrictions in 2013, researchers were unable to sample CIRWG lands in the Gold Creek Corridor and in the southwestern part of the proposed Watana Reservoir. To complete the survey of the Project area, field surveys for rare plants will be conducted in those areas in 2015.
- No work was performed on the Rare Plant Study in 2014.

Steps to Complete Study 11.8 (ISR Part C – Section 7.1)

- Using the list of rare plant species compiled in 2013, conduct field surveys in 2015 to locate any additional populations of rare vascular plant species that occur in those portions of the Project area that were unsurveyed in 2013 and could be disturbed by Project construction and operations activities (RSP Section 11.8.4.1).
- Estimate population sizes for any rare vascular plant species found in 2013 and 2015 and map their locations in GIS (RSP Section 11.8.4.1).
- Both of these tasks will be completed as described in the ISR.

Licensing Participants Proposed Modifications to Study 11.8?

- **Agencies**
- **CIRWG members and Ahtna**
- **Public**

Initial Study Report Meeting

Study 11.9 Invasive Plants

October 21, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 11.9 Objectives

- Identify the locations at which invasive plant species have already become established in the Project area and in nearby disturbed areas
- Estimate population sizes for invasive species and map their current distributions
- Determine whether any of the invasive species found could pose a substantial ecological threat (to native plants and animals) if populations were to spread into the Project area

Study 11.9 Components

- Field surveys for invasive vascular plant species in disturbed areas in and near the Project area (ISR Part A, Section 4.1, p. 2)

- Conduct an ecological risk assessment for each of the invasive species found to assess the possibility and the ecological effects of spreading into the Project area (ISR Part A, Section 4.2, p. 4)

Study 11.9 Variances

During 2013, there were no variances from the methods used to conduct field surveys and ecological risk assessments for invasive species as described in the RSP (Section 11.9.4).

Study 11.9 Summary of Results in ISR (ISR Part A – Section 5)

Field Surveys:

- 107 sites were sampled from August 19–28, 2013
- Sites surveyed included possible source areas for invasive plants (the Denali and Parks highway corridors near the Project area and regularly-used ORV trails that provide access to the Project area)
- 28 of the 107 sites were revisits to sites where infestations of invasive plants had been previously documented by the Alaska Natural Heritage Program
- Invasive species were found at 98 of the 107 sites sampled
- Across all sites, 31 invasive species were found

Study 11.9 Summary of Results in ISR (ISR Part A – Section 5)

The 15 species with the highest invasiveness rankings

Scientific Name	Common Name	No. Sites Recorded	Invasiveness Rank
Melilotus alba	**white sweetclover**	**7**	**81**
Bromus tectorum	**cheatgrass**	**1**	**78**
Vicia cracca* ssp. *cracca	**bird vetch**	**4**	**73**
Linaria vulgaris	**butter and eggs**	**2**	**69**
Melilotus officinalis	**yellow sweetclover**	**1**	**69**
Hordeum jubatum	**foxtail barley**	**50**	**63**
Bromus inermis* ssp. *inermis	**smooth brome**	**5**	**62**
Leucanthemum vulgare	**oxeye daisy**	**2**	**61**
Tanacetum vulgare	**common tansy**	**1**	**60**
Trifolium repens	**white clover**	**7**	**59**
Taraxacum officinale	**common dandelion**	**71**	**58**
Trifolium hybridum	**alsike clover**	**20**	**57**
Crepis tectorum	**narrowleaf hawksbeard**	**10**	**56**
Phleum pratense	**timothy**	**22**	**54**
Poa pratensis* ssp. *irrigata	**spreading bluegrass**	**10**	**52**

Study 11.9 Summary of Results in ISR (ISR Part A – Section 5)

Preliminary Ecological Risk Assessment:

- Populations of invasive species found in 2013 were negligible to small in size, so the current ecological risk from invasive plants—at least in the Parks and Denali highway corridors—is relatively low.
- The two species found that are of greatest concern probably are *Hordeum jubatum* (foxtail barley) and *Melilotus alba* (white sweetclover).
  - *H. jubatum* (invasiveness rank: 63) is able to colonize a wide range of disturbed habitats, from well drained, gravelly substrates to relatively wet, silty soils.
  - *M. alba* (invasiveness rank: 81) is considered one of Alaska's most problematic invasive species, due to its propensity to form dense stands on river bars and potentially having a negative effect on native colonizing plants.
- Both *H. jubatum* and *M. alba*, however, were found mostly at trace (< 1%) and low (1–5%) cover values during the 2013 survey.

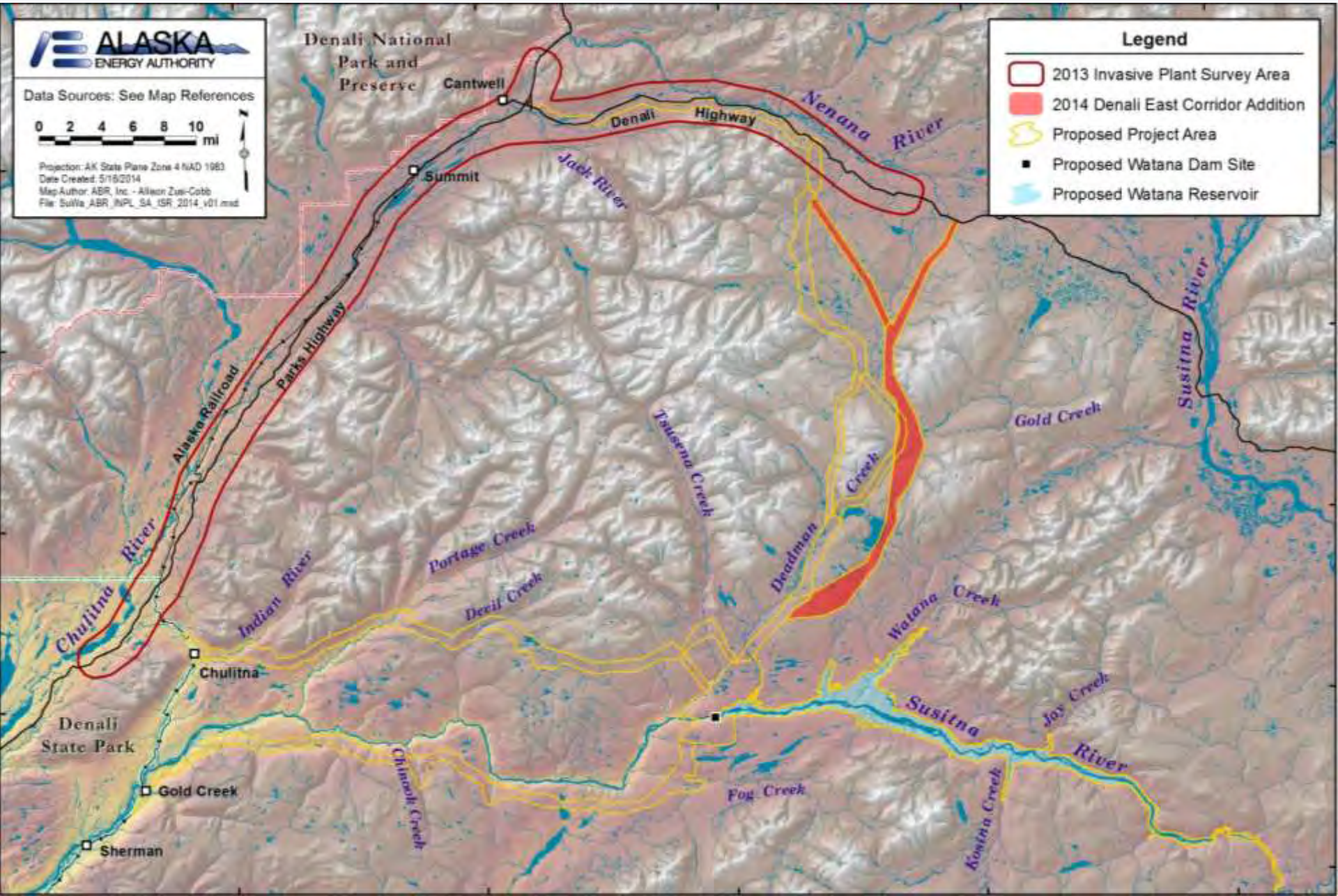
Study 11.9 Summary of Results since ISR

No additional work has been conducted for this study since submittal of the ISR.

AEA Proposed Modifications to Study 11.9 in ISR (ISR Part C – Section 7.1.2)

- No modifications to the Study Plan methods are needed to complete the study and meet the Study Plan objectives.
- However, the study area has changed from that described in the RSP (Section 11.9.3), with the addition of the alternative Denali Corridor East Option road and transmission line corridor. For this study, additional sample sites for invasive plant species will be surveyed in 2015 along the Denali Highway near where the new Denali Corridor East Option corridor would connect with the existing Denali Highway.
- As described for each of the alternative road and transmission line corridors in the RSP (Section 11.9.3), in 2015 the study team also will evaluate the possibility of sampling disturbed sites (e.g., ORV trails) within the 2-mi buffer used for the Denali Corridor East Option by the Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin (ISR Study 11.5).

AEA Proposed Revision to Study Area (ISR Study 11.9, Part C – Section 7.1.2)



Current Status Study 11.9

- In 2013, field surveys for invasive plants were completed as described in the RSP (Section 11.9.4.1) with no variances; no field surveys were conducted in 2014.
- In 2013, a preliminary ecological risk assessment was conducted for the invasive species located to date, as described in the RSP (Section 11.9.4.2).
- No work was performed on the Invasive Plant Study in 2014.

Steps to Complete Study 11.9 (ISR Part C – Section 7.1)

- Conduct field surveys in 2015 in disturbed areas in and near the Project area that were not surveyed in 2013 (RSP Section 11.9.4.1); example sampling areas to be targeted include portions of the Denali Highway (noted above), Stephan Lake and High Lake lodges, Gold Creek Camp, and selected portions of the Alaska Railroad ROW.
- As in 2013, the Alaska Exotic Plants Information Clearinghouse (AKEPIC) database and current aerial imagery will be reviewed prior to the 2015 survey to identify locations of previous collections of invasive species and disturbed sites to help guide survey efforts (RSP Section 11.9.4.1).
- Conduct an ecological risk assessment for the invasive plant species found in 2013 and 2015 to evaluate the threat those species may pose to the native plant communities occurring in the Project area (RSP Section 11.9.4.2).
- Each of these tasks will be completed as described in the ISR.

Licensing Participants Proposed Modifications to Study 11.9?

- **Agencies**
- **CIRWG members and Ahtna**
- **Public**